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Fish Population Data from Split and Stephens Lakes, 1989.

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ABSTRACT

The fish populations of Split and Stephens lakes were sampled in the summer of 1989. The collected data are summarized in this report, with special emphasis on the relative abundance of each species and the effects of various mesh sizes on fish species. Growth rates, age compositions, maturity, survival and mortality rates of whitefish (Coregonus clupeaformis), walleye (Stizostedion vitreum vitreum), sauger (Stizostedion canadense) and northern pike (Esox lucius) are also described, in order to provide a data base for future management purposes.

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INTRODUCTION

The data presented in this report were collected in the summer of 1989 as part of the Ecological Monitoring Project. The purpose of the Ecological Monitoring Project is to ascertain and to evaluate current impacts and long term effects on existing and planned hydroelectric developments in northern Manitoba on abiotic and biotic environments in affected lakes and watercourses. The specific purpose is to address concerns expressed under Claim #18 of the Northern Flood Agreement. This report is of a preliminary nature, confined only to the description of fish populations in Split and Stephens lakes.

The main objectives of this report are:

1) to list the fish species caught, along with their relative abundance and catches per unit of effort,
2) to compare the effects of various mesh sizes on the number and total weight of each species caught and,
3) to describe age-composition, length-frequency distributions, maturity, growth and mortality regimes of whitefish, walleye, sauger and northern pike.

The function of this report is to provide baseline data on the fish populations of these lakes, therefore interpretation and discussion of the results is not included.

METHODS

Experimental Netting

All lakes were fished with a standard gang of gillnets. Each gang was composed of six gillnets with the following mesh sizes: 3.8 cm (1.5 in.), 5.1 cm (2 in.), 7.6 cm (3 in.), 9.5 cm (3.75 in.), 10.8 cm (4.25 in.) and 12.7 cm (5 in). Each net in the gang was 22.9 m (25 yd.) long and 1.8 m (5 ft.) deep. Gillnets were set overnight for a 16-20 h duration.

Fork length and round weight were recorded for all fish caught. Sex and state of maturity were recorded for the principal commercial species, whitefish, walleye, sauger and northern pike. For age determination otoliths were taken from whitefish, walleye and sauger. Cleithra were taken from northern pike. Otoliths were prepared and aged according to procedures described by Erickson (1979). Cleithra were cleaned of flesh and aged using an illuminated magnifying glass.

Calculations

Routine statistical analyses were performed according to Snedecor and Cochran (1967). Maturity, mortality and growth analyses were performed as described by Hagenson (1987). The presentation format of some figures and tables may have changed slightly.

RESULTS

Standard gang netting locations in Split and Stephens lakes are identified in Figs. 2-4 and 6-8. The catches of all species in each standard gang are enumerated in Tables 1 and 2. Average catches per standard gang and the relative abundance of each species are compared in Table 3. The number and total weight of each species caught in nets of different mesh sizes are listed in Table 4 and 5.

Further analyses are performed for whitefish, cisco, walleye, sauger, and northern pike. These analyses include:

1) the effects of different mesh sizes on the catch per unit of effort, mean length, mean weight, percentage of mature fish, mean age and age-% frequency (Tables 6-19),
2) age-specific size and maturity conditions for males, females and both sexes combined (Tables 20-28),
3) length-weight regressions (Table 29),
4) age-% frequency distribution for both sexes combined (Figs. 9-13), and length-frequency distributions (Figs. 14-21).
5) maturity regimes for males, females and both sexes combined (Table 30), and mortality-survival rates for both sexes combined (Table 31), and
6) derivation of von Bertalanffy's growth curves for both sexes combined (Table 32 and 33 and Figs. 23-26).

ACKNOWLEDGEMENTS

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Snedecor, G. W. and W. G. Cochran. 1967. Statistical Methods. 6th ed. Iowa State Univ. Press, Ames, Iowa. 593pp.

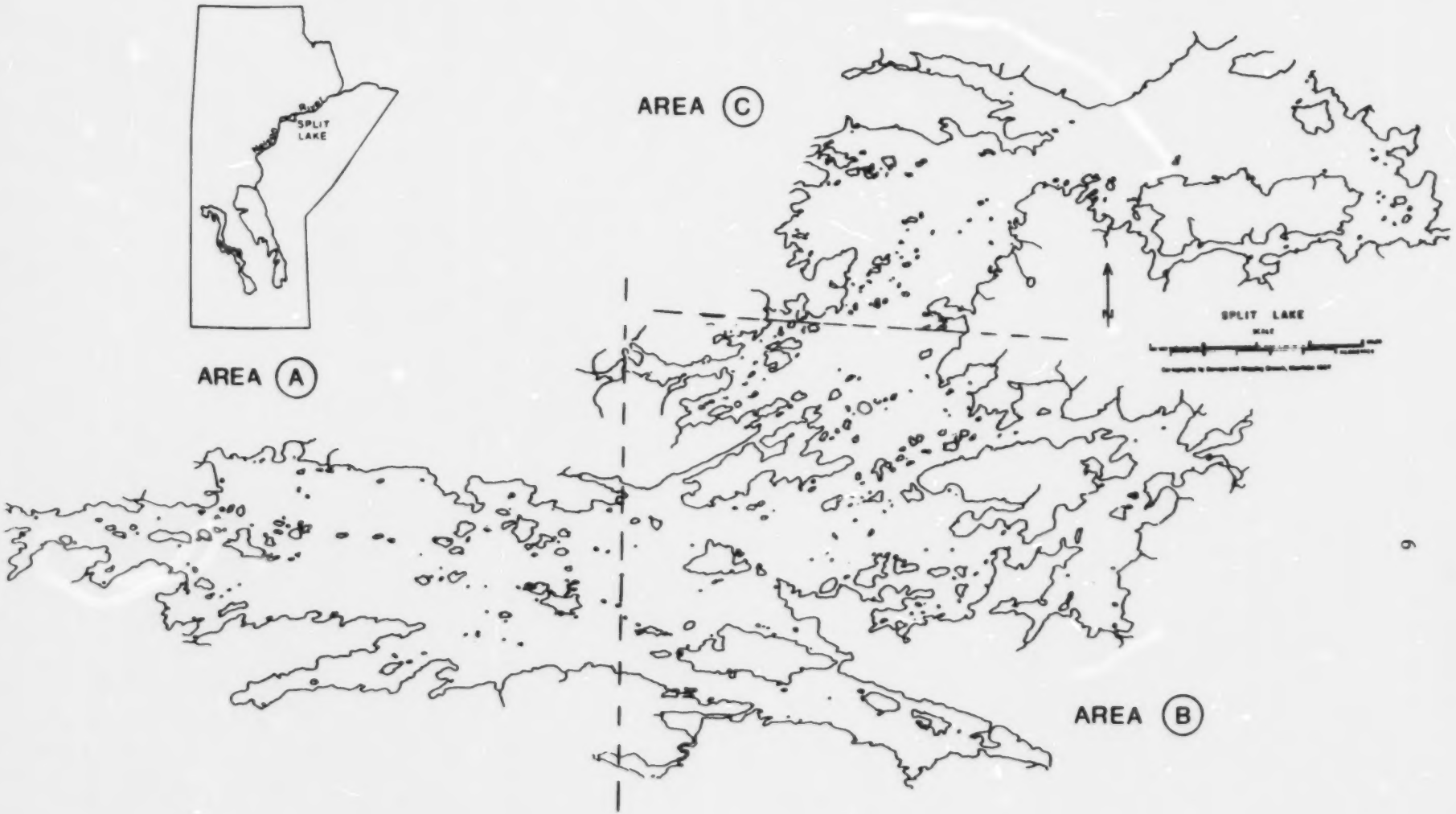

Fig. 1. Map of Split Lake showing large scale area boundaries.

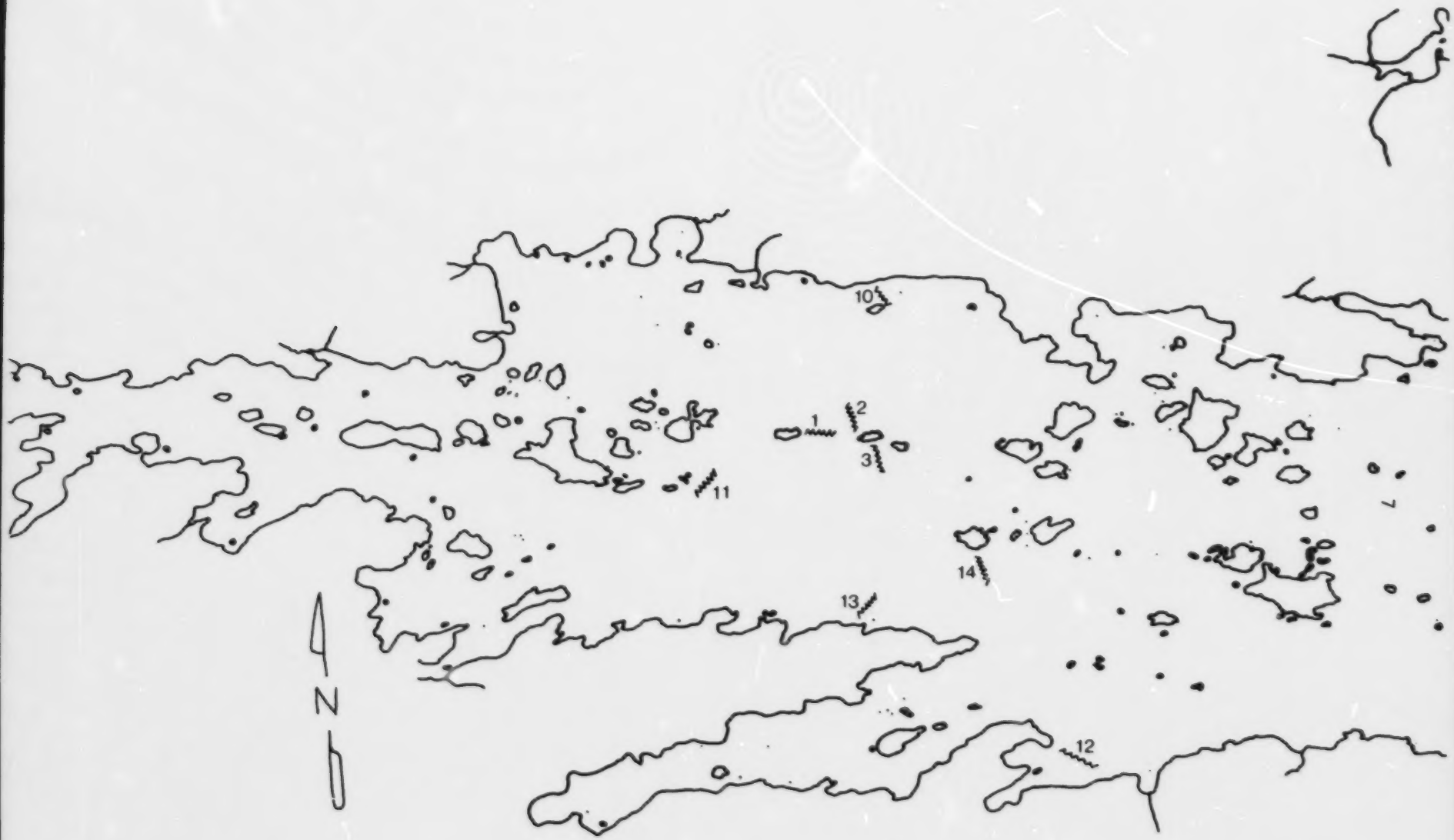

Fig. 2. Net set locations in Area A, Split Lake, 1989.

Fig. 3. Net set locations in Area B, Split Lake, 1989.

Fig. 4. Net set locations in Area C, Split Lake, 1989.

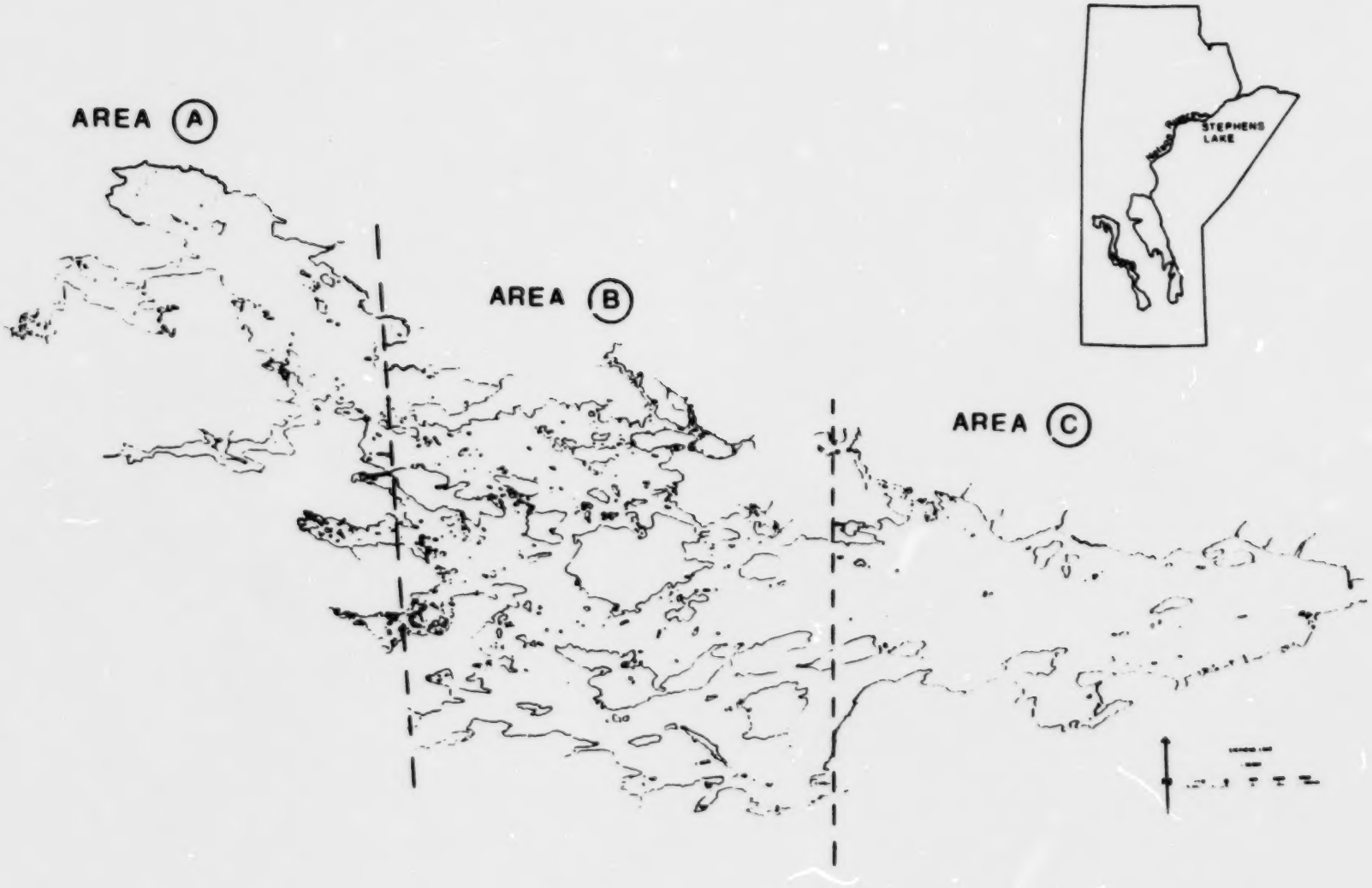

Fig. 5. Map of Stephens Lake showing large scale boundaries.

Fig. 6. Net set locations in Area A, Stephens Lake, 1989.

Fig. 7. Net set locations in Area B, Stephens Lake, 1989.

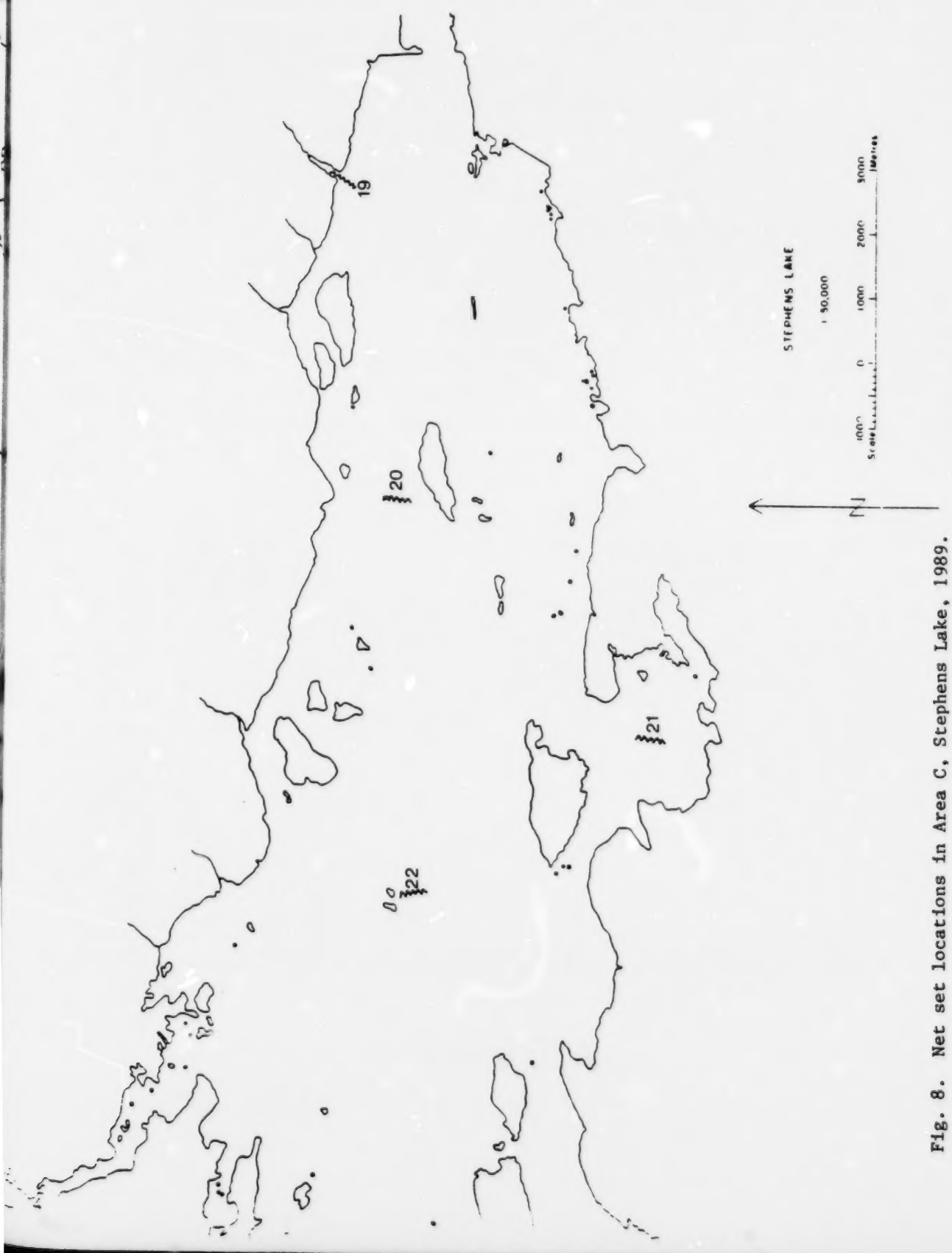

Fig. 8. Net set locations in Area C, Stephens Lake, 1989.

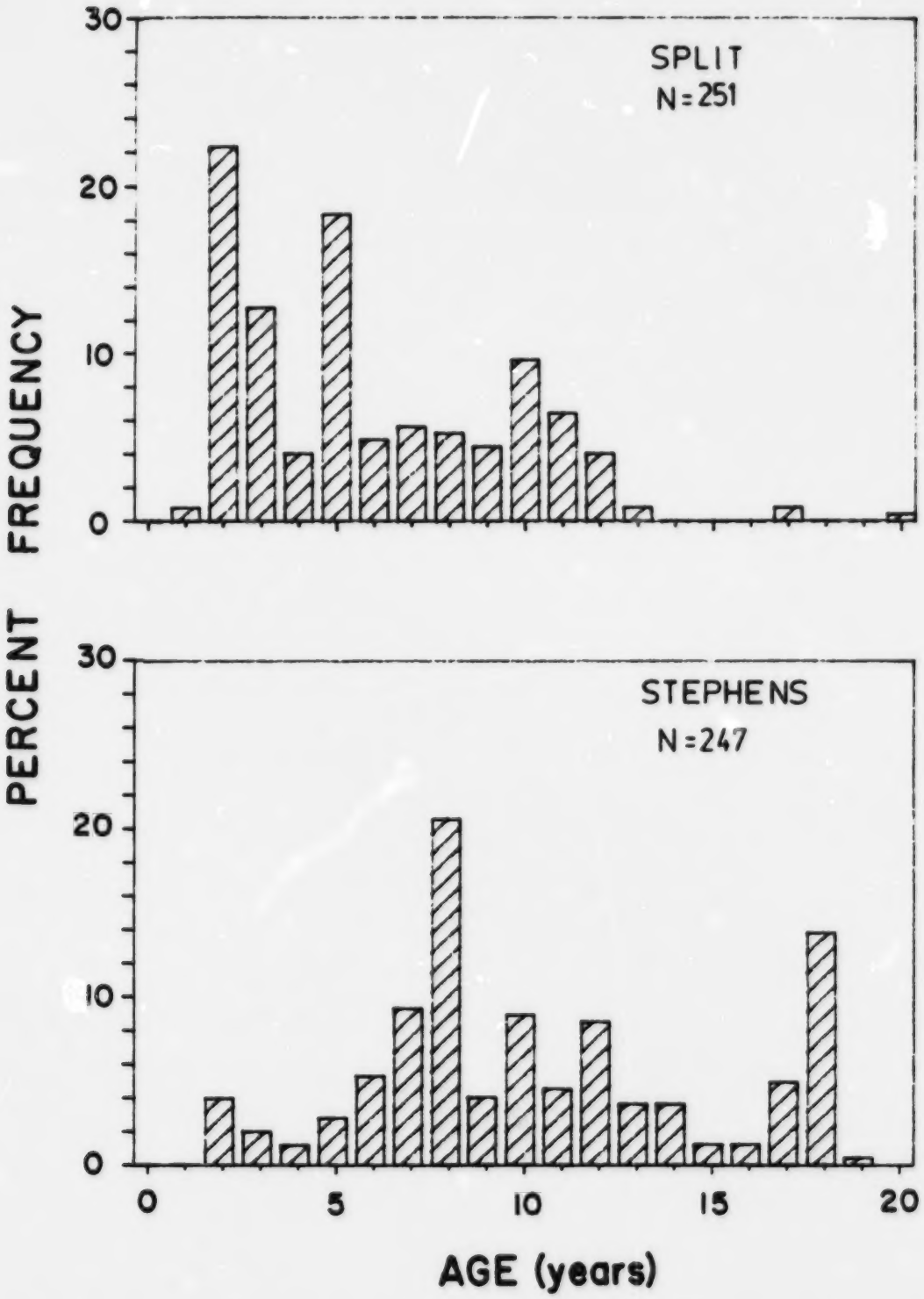

Fig. 9. Age composition of whitefish from Split and Stephens lakes, 1989.

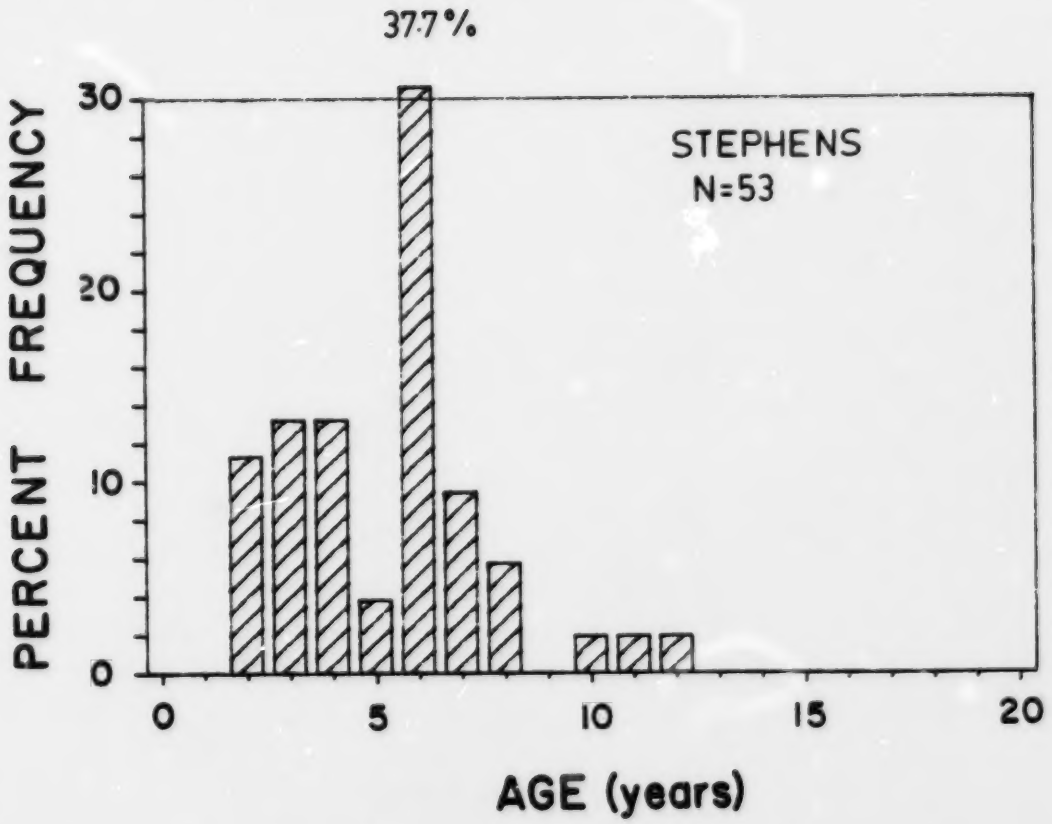

Fig. 10. Age composition of cisco from Stephens Lake, 1989.

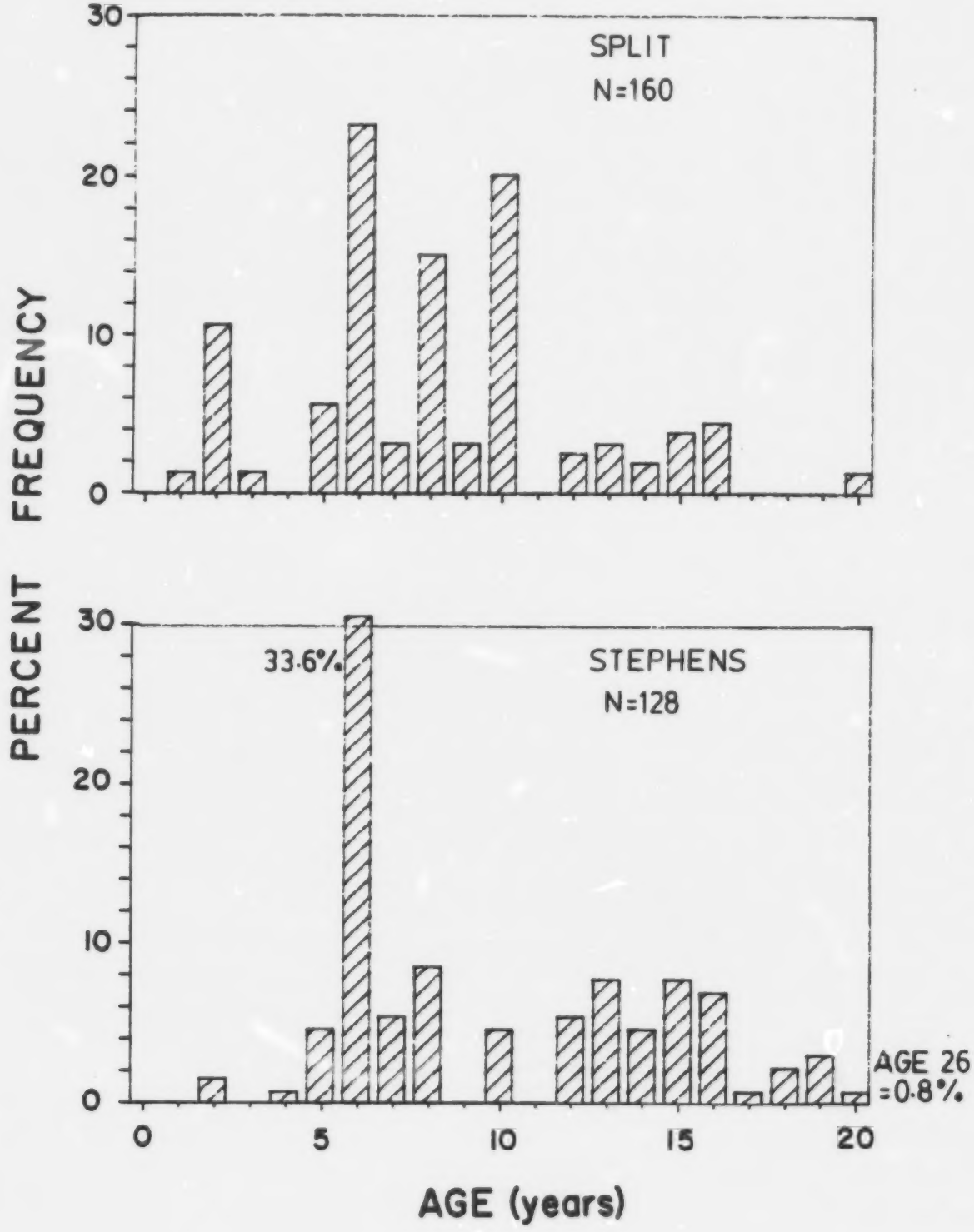

Fig. 11. Age composition of walleye from Split and Stephens lakes, 1989.

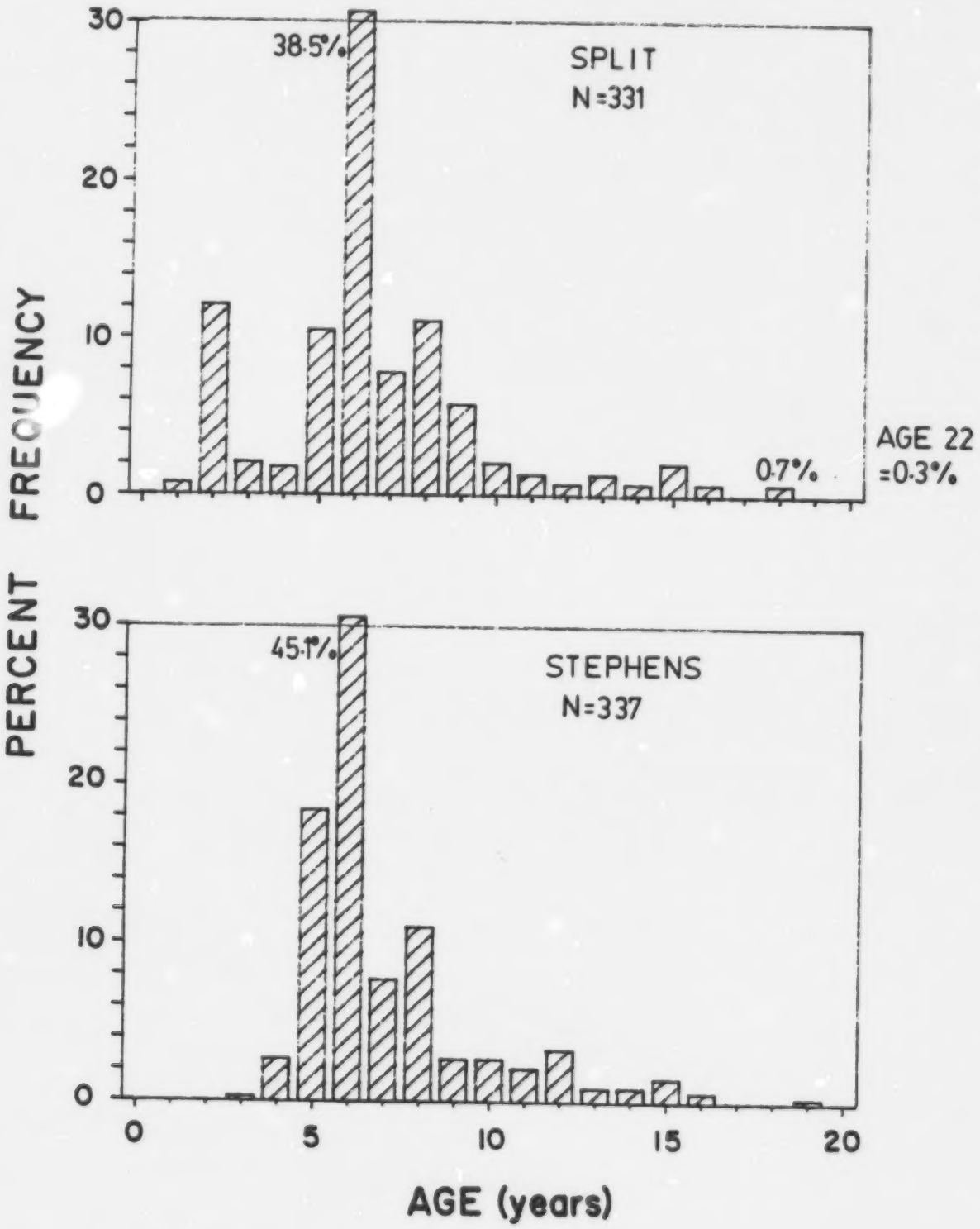

Fig. 12. Age composition of sauger from Split and Stephens lakes, 1989.

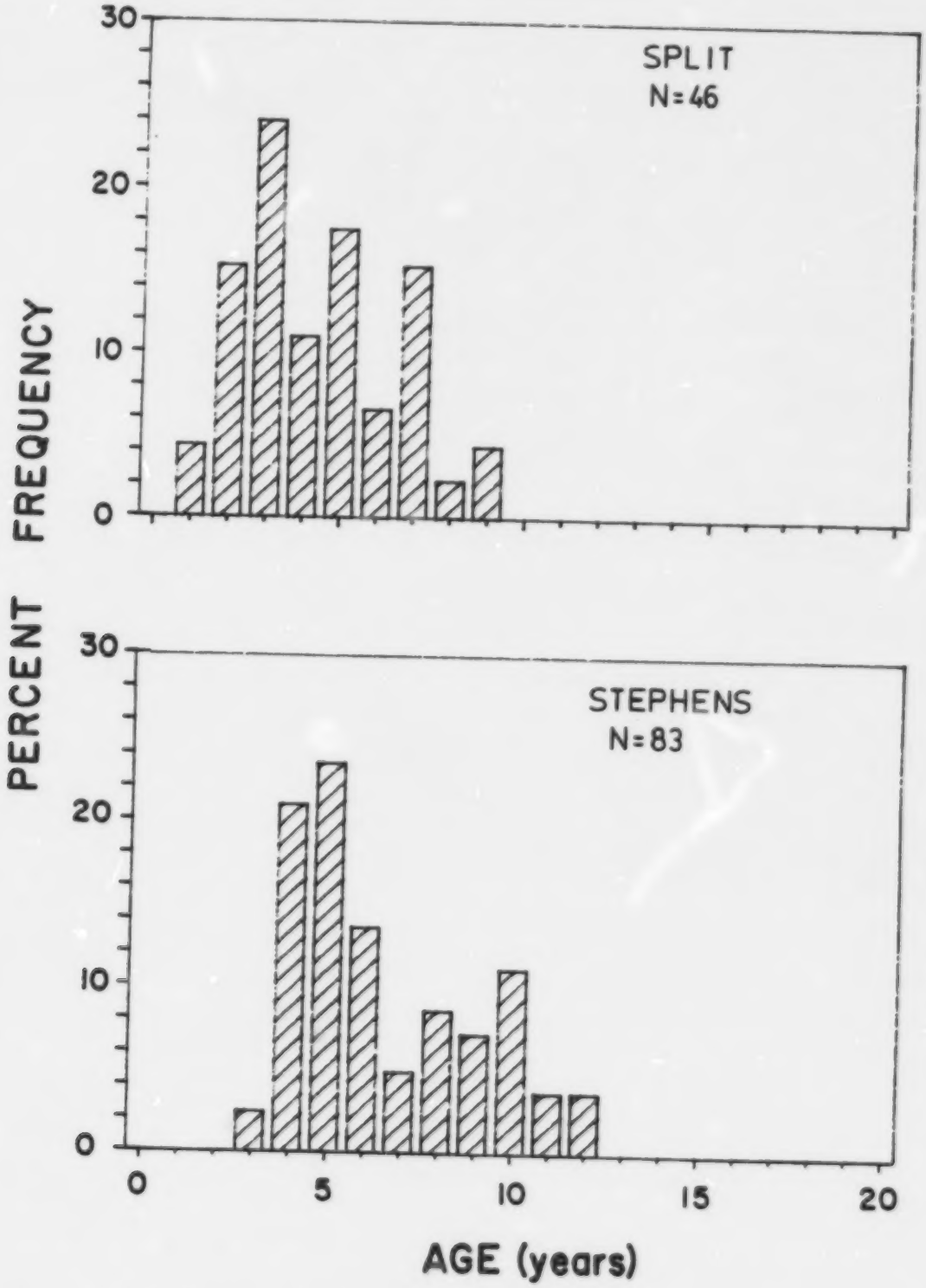

Fig. 13. Age composition of northern pike from Split and Stephens lakes, 1989.

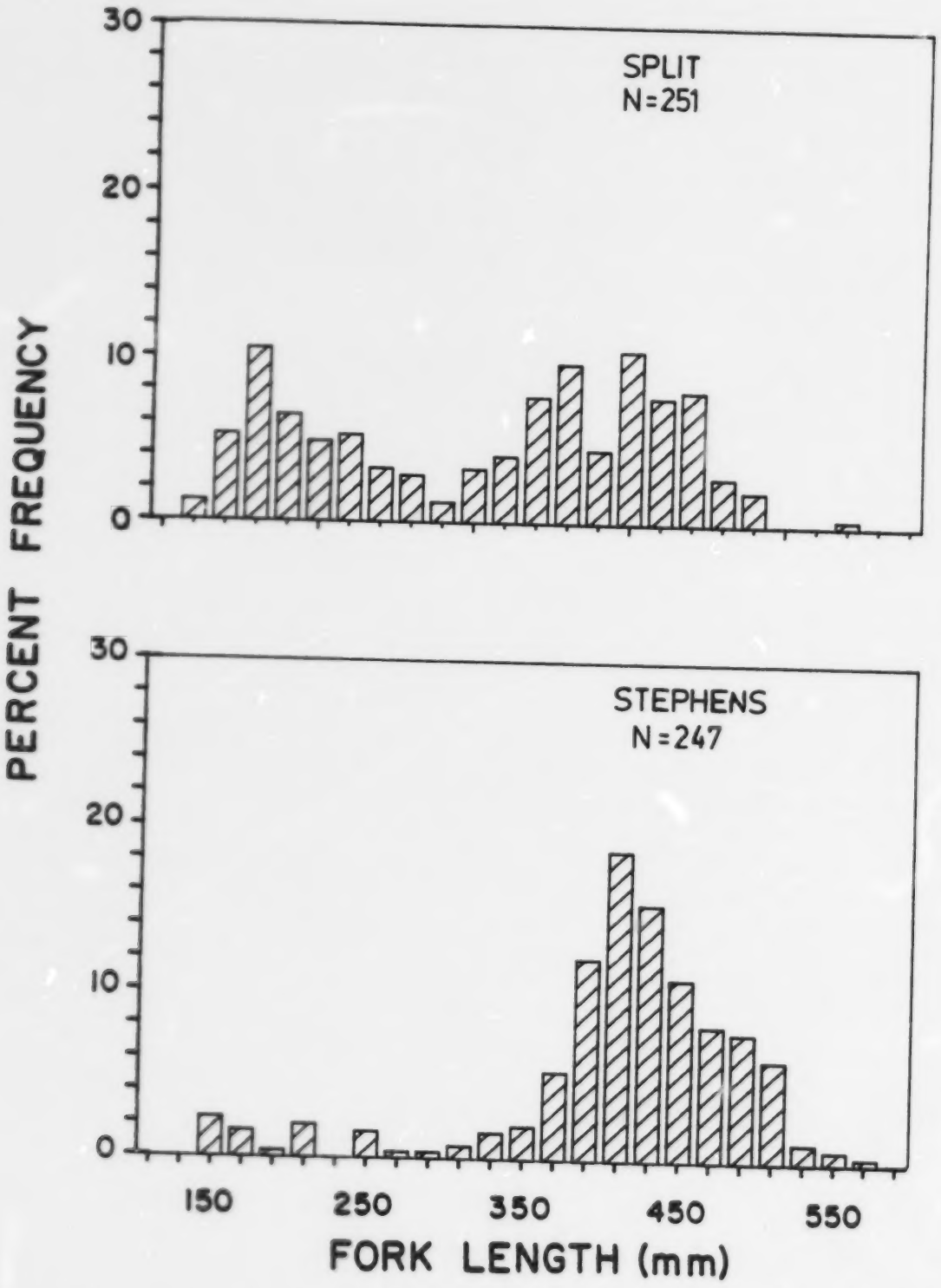

Fig. 14. Length - frequency distribution for whitefish from Split and Stephens lakes, 1989.

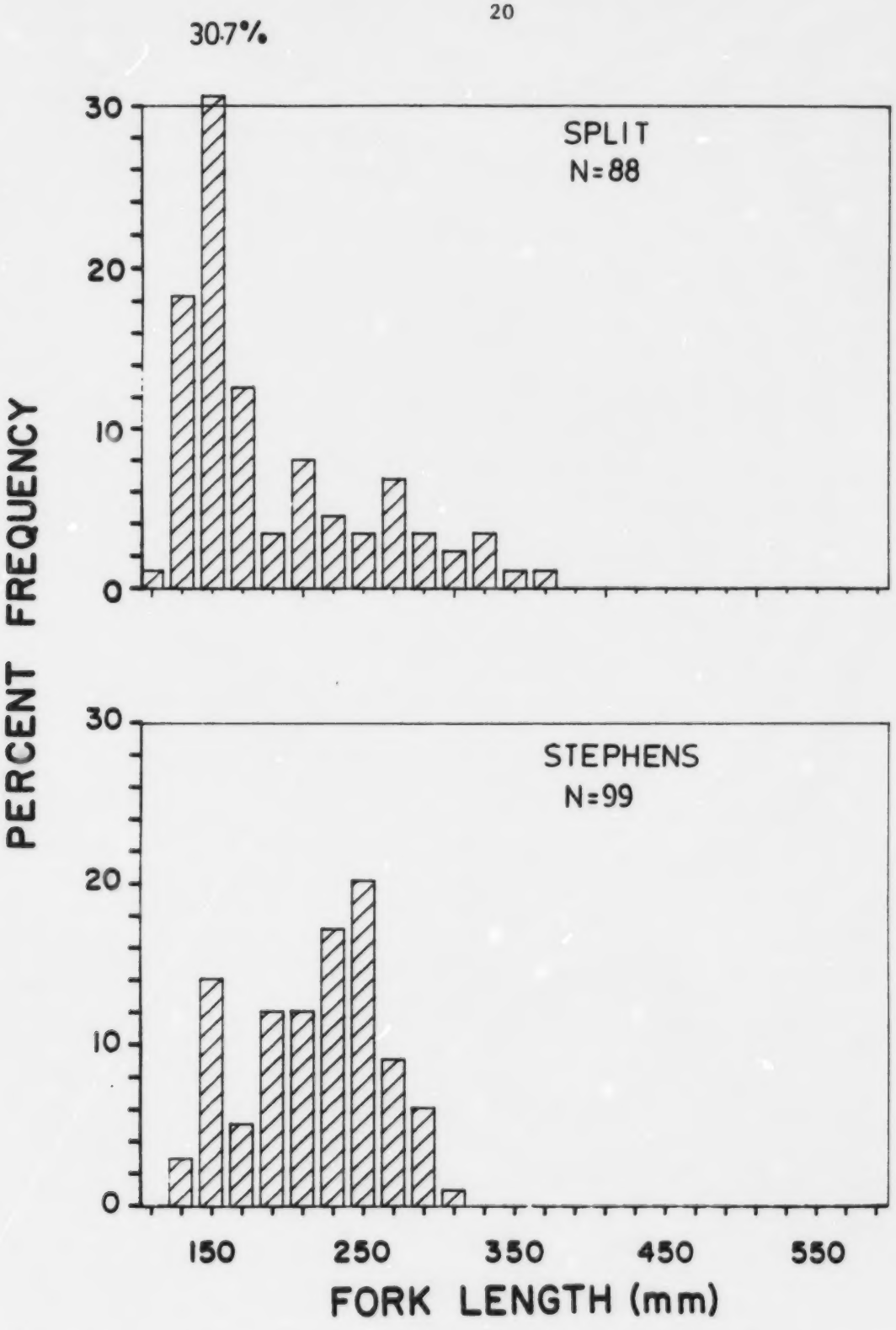

Fig. 15. Length - frequency distribution for cisco from Split and Stephens lakes, 1989.

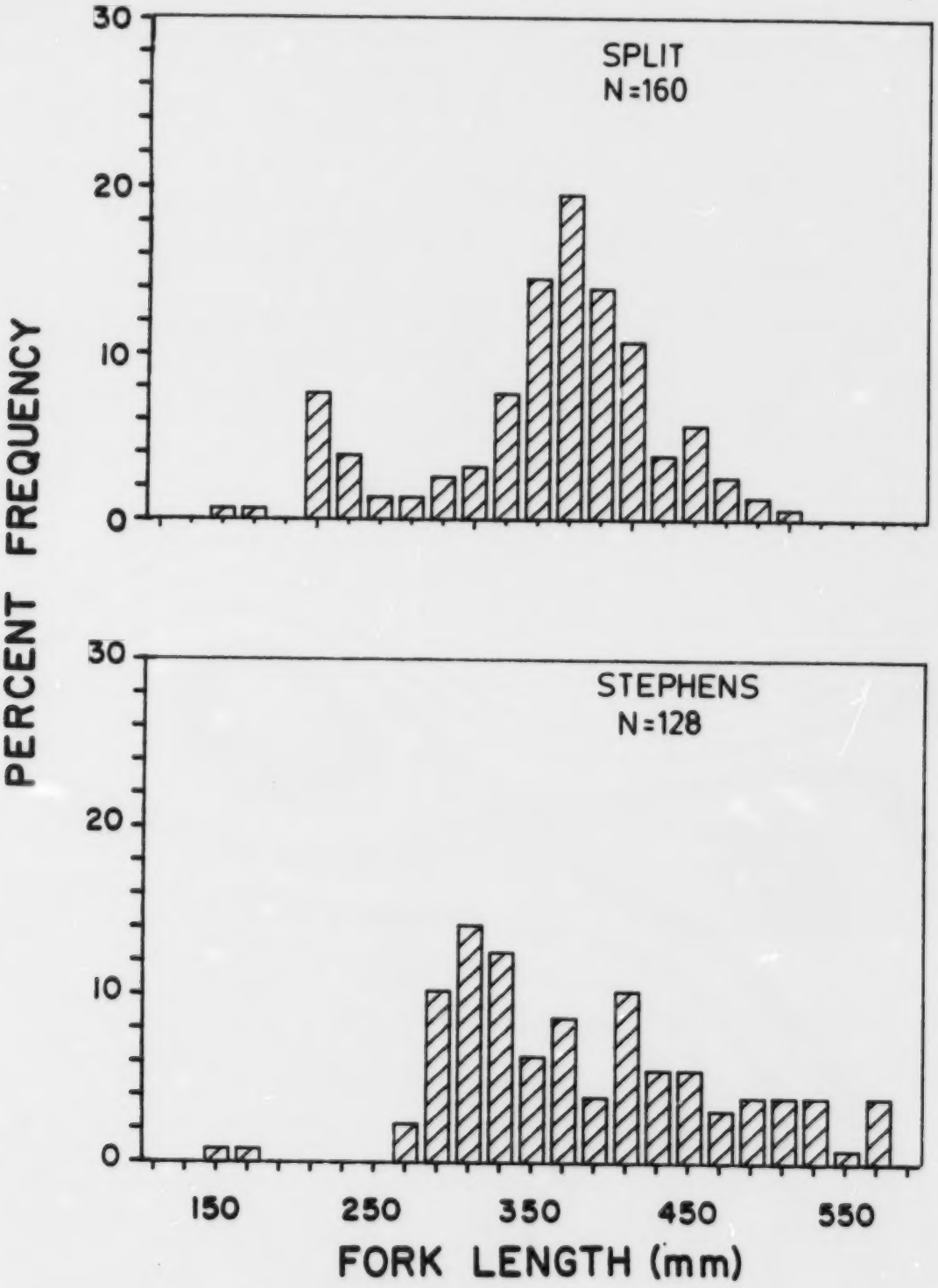

Fig. 16. Length - frequency distribution for walleye from Split and Stephens lakes, 1989.

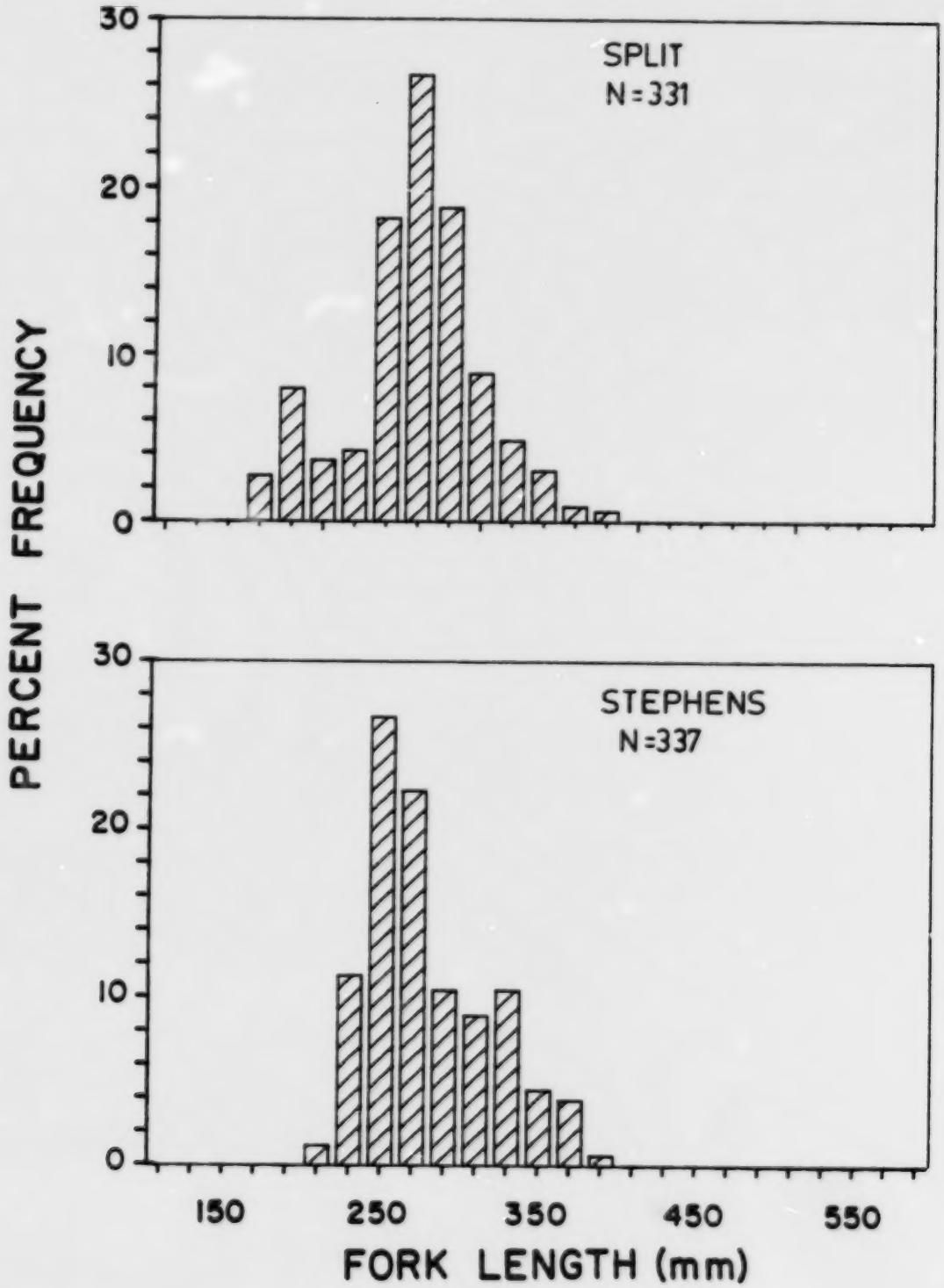

Fig. 17. Length - frequency distribution for sauger from Split and Stephens lakes, 1989.

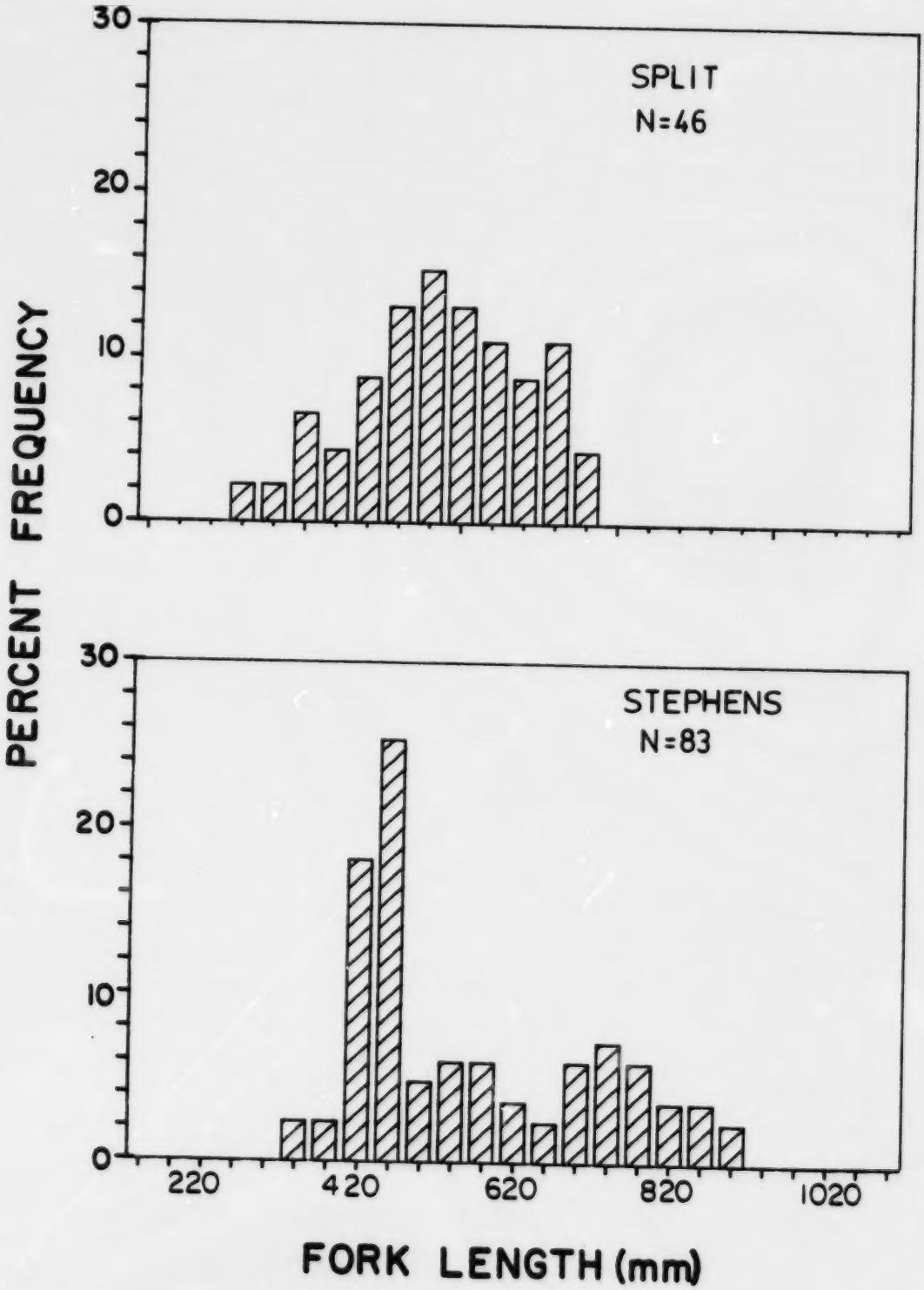

Fig. 18. Length - frequency distribution for northern pike from Split and Stephens lakes, 1989.

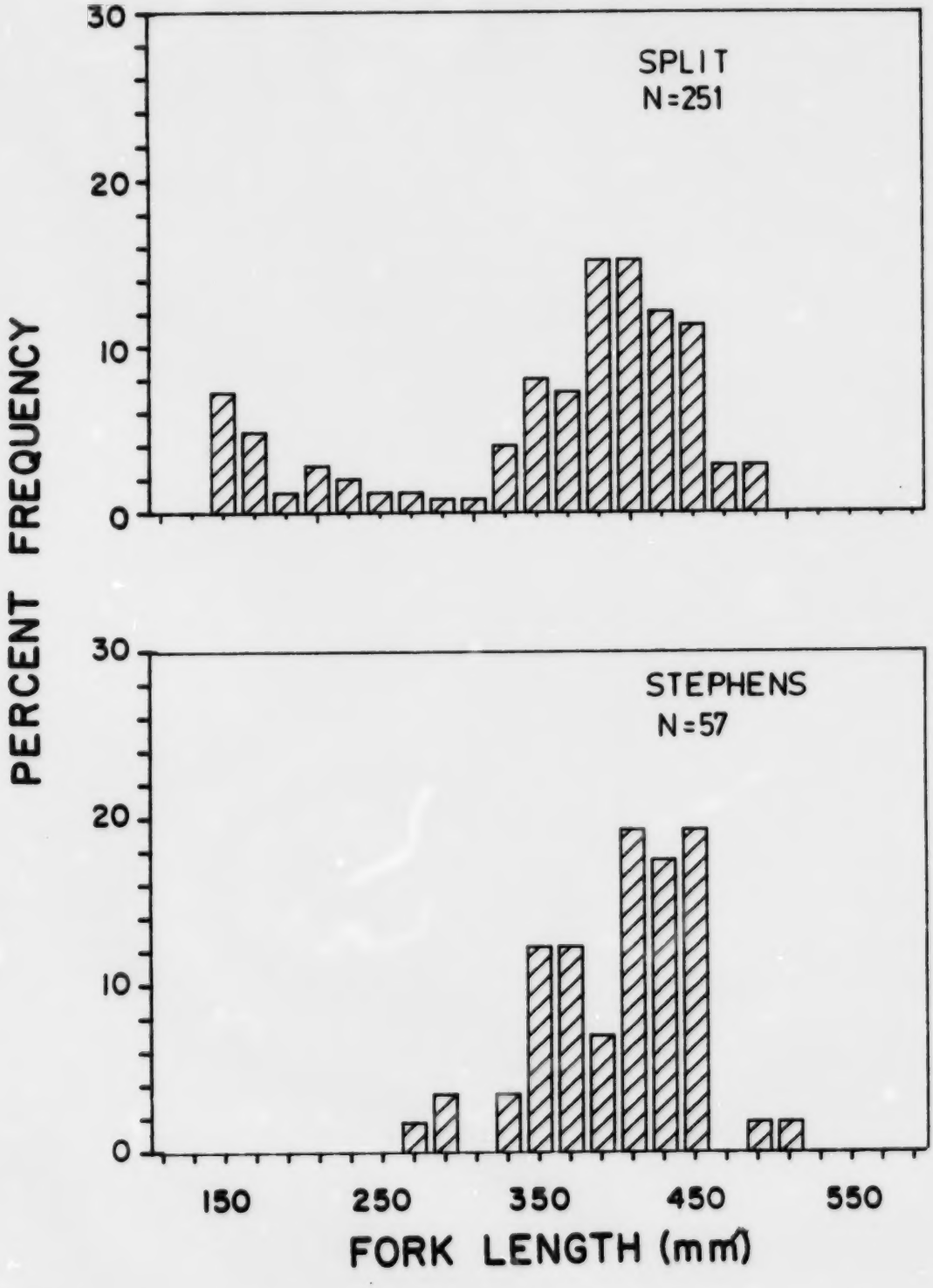

Fig. 19. Length - frequency distribution for white suckers from Split and Stephens lakes, 1989.

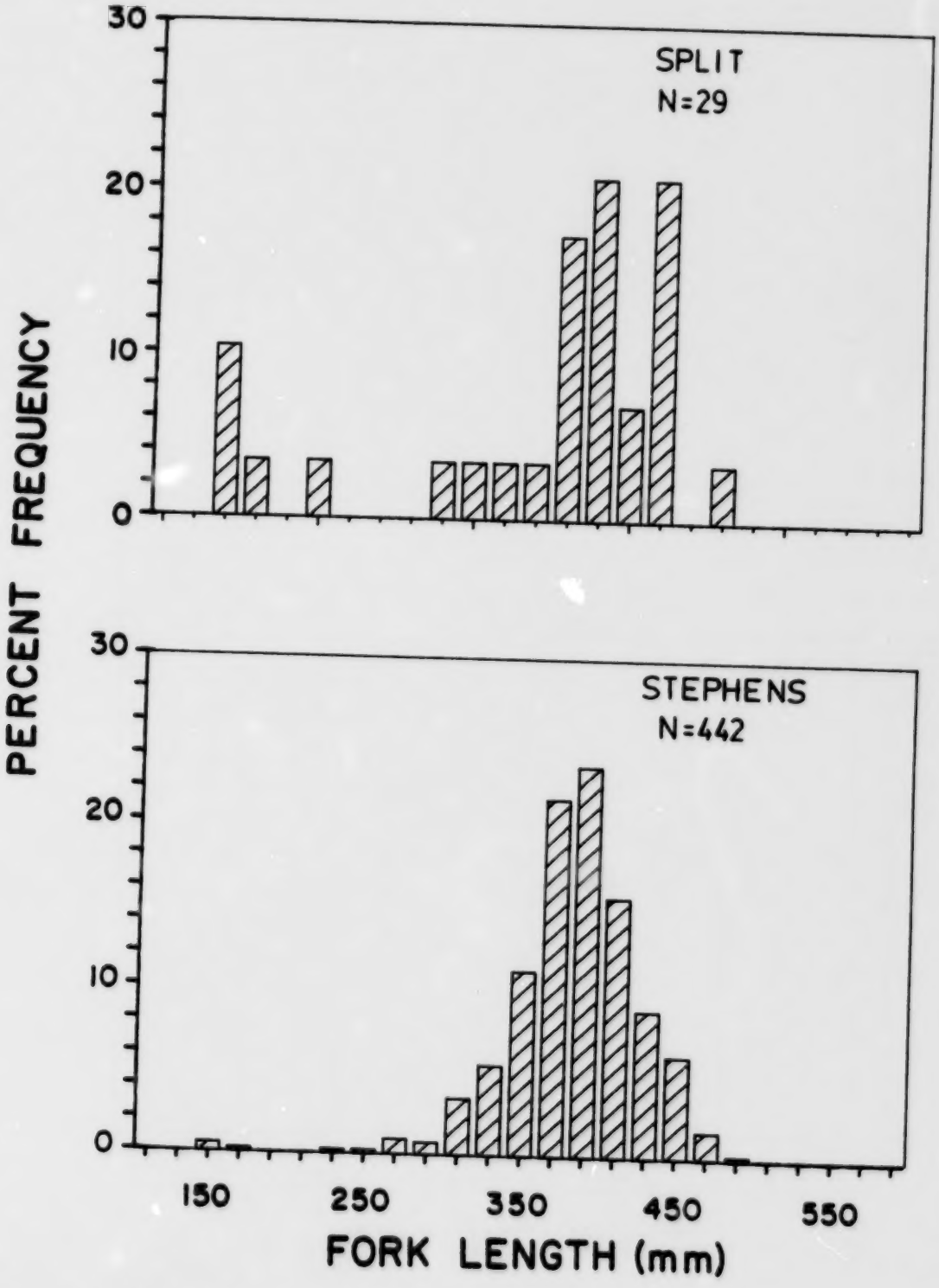

Fig. 20. Length - frequency distribution for longnose suckers from Split and Stephens lakes, 1989.

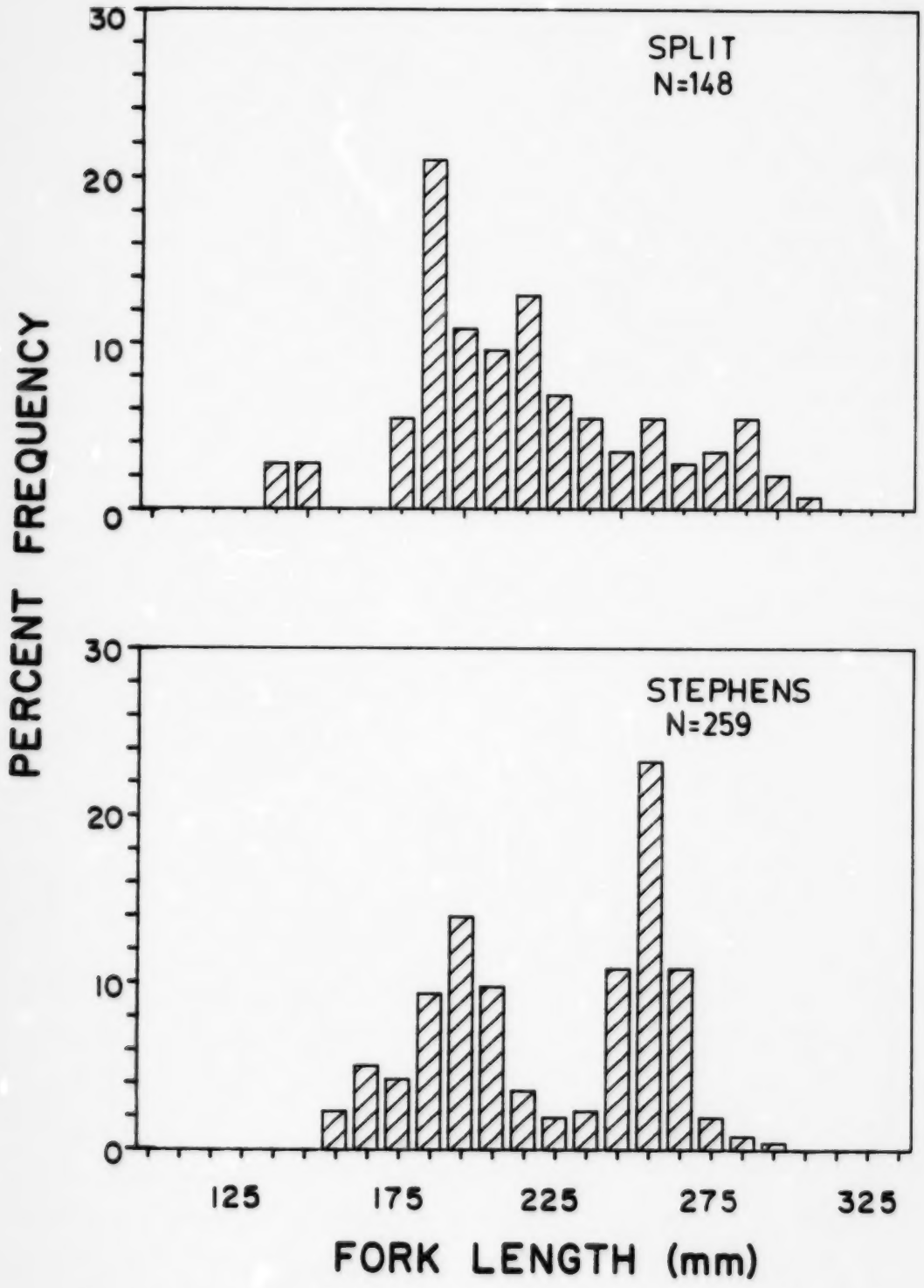

Fig. 21. Length - frequency distribution for mooneye from Split and Stephens lakes, 1989.

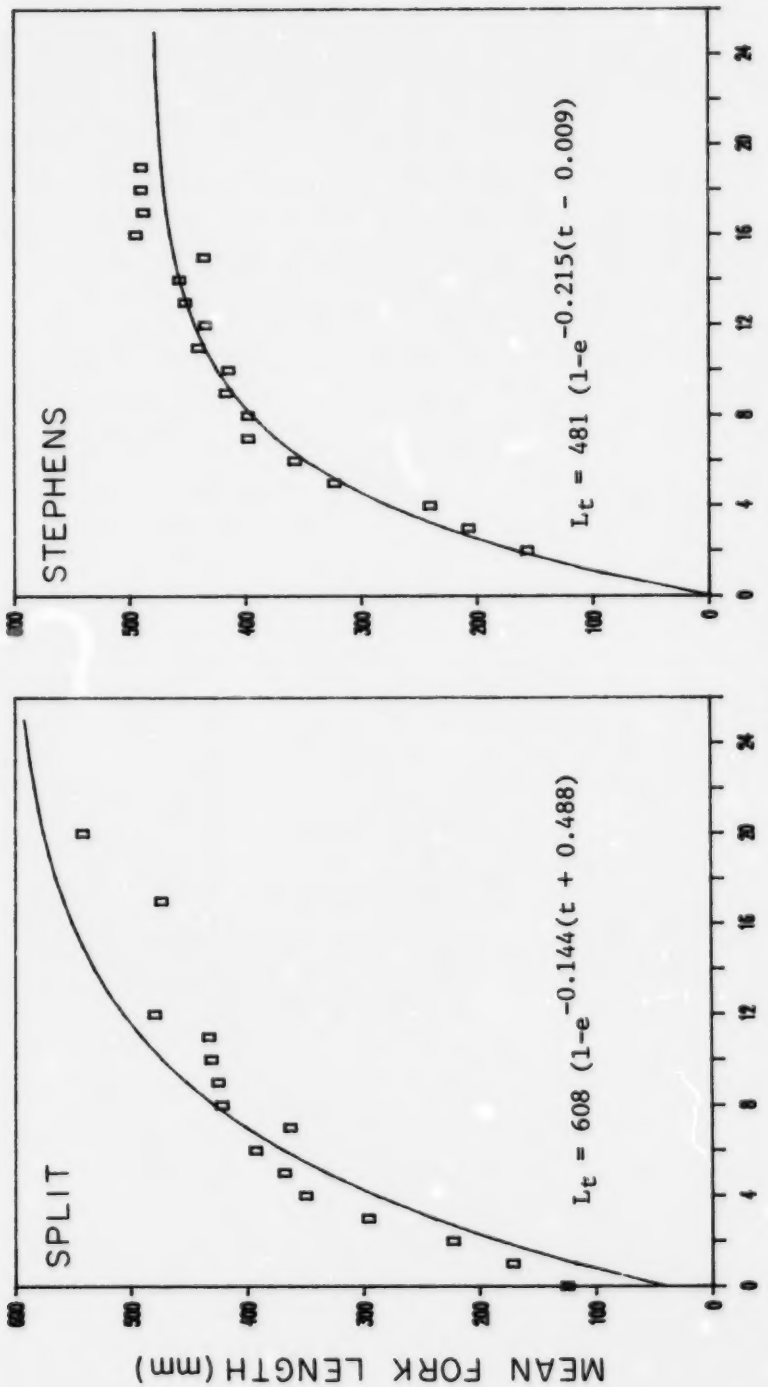

Fig. 22. von Bertalanffy curve for whitefish from Split and Stephens lakes, 1989.

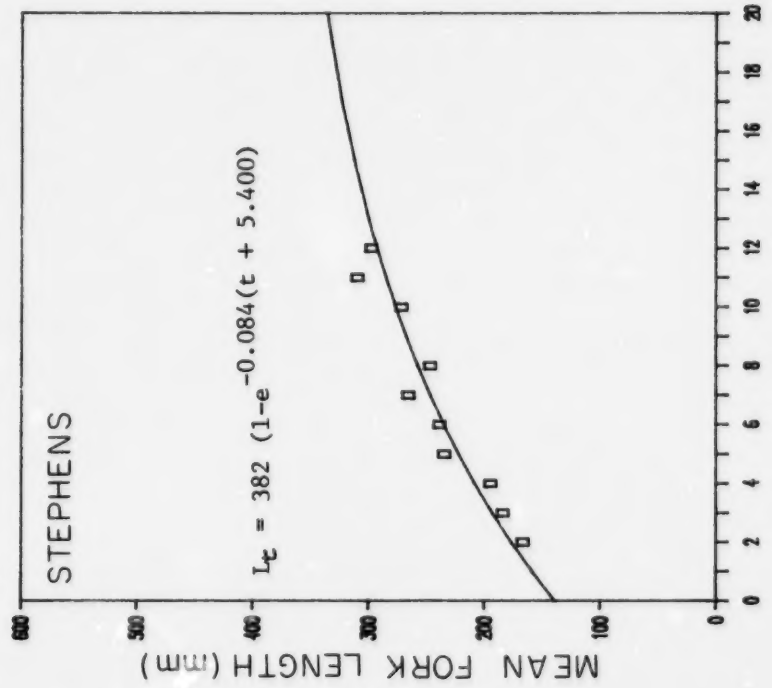

Fig. 23. von Bertalanffy curve for cisco from Stephens Lake, 1989.

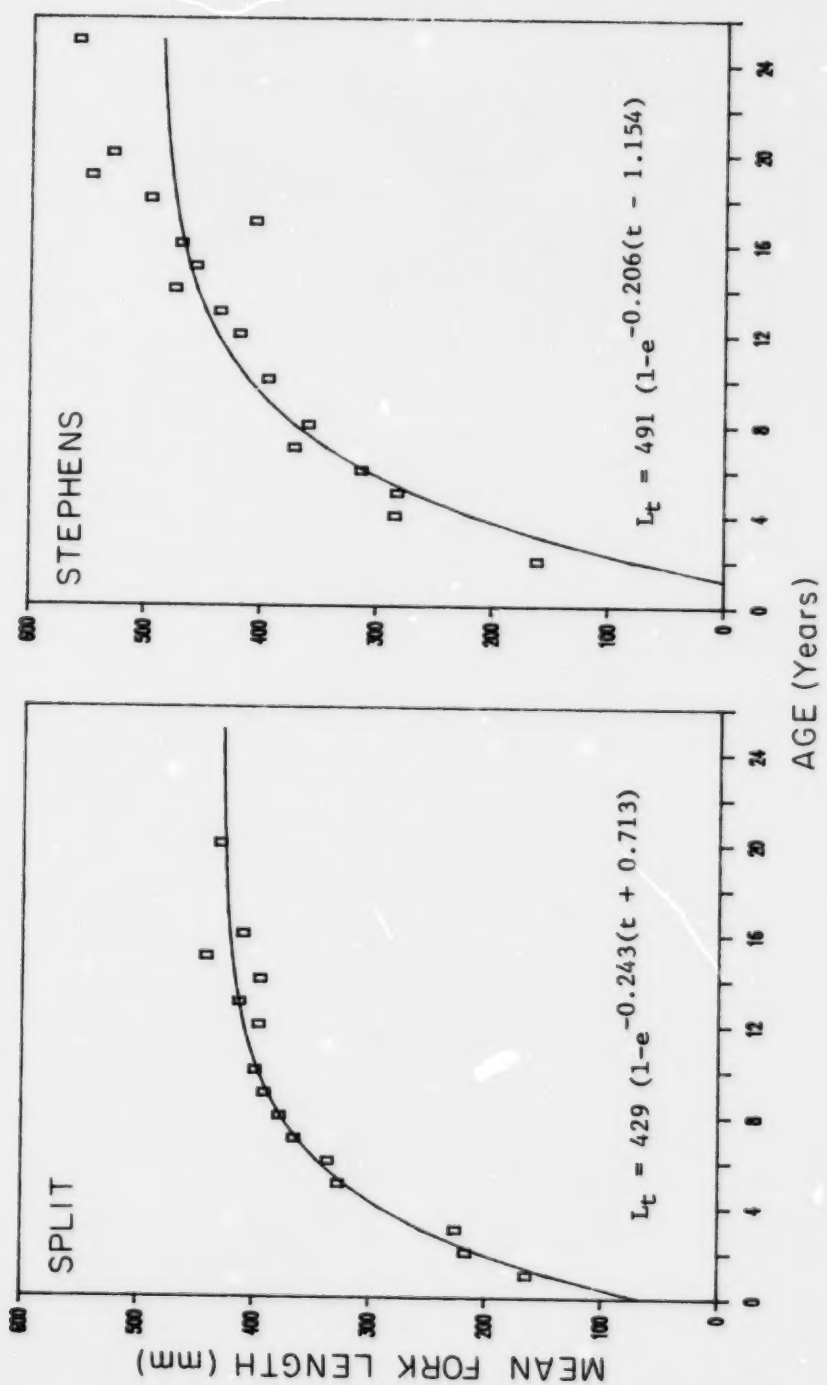

Fig. 24. von Bertalanffy curve for walleye from Split and Stephens lakes, 1989.

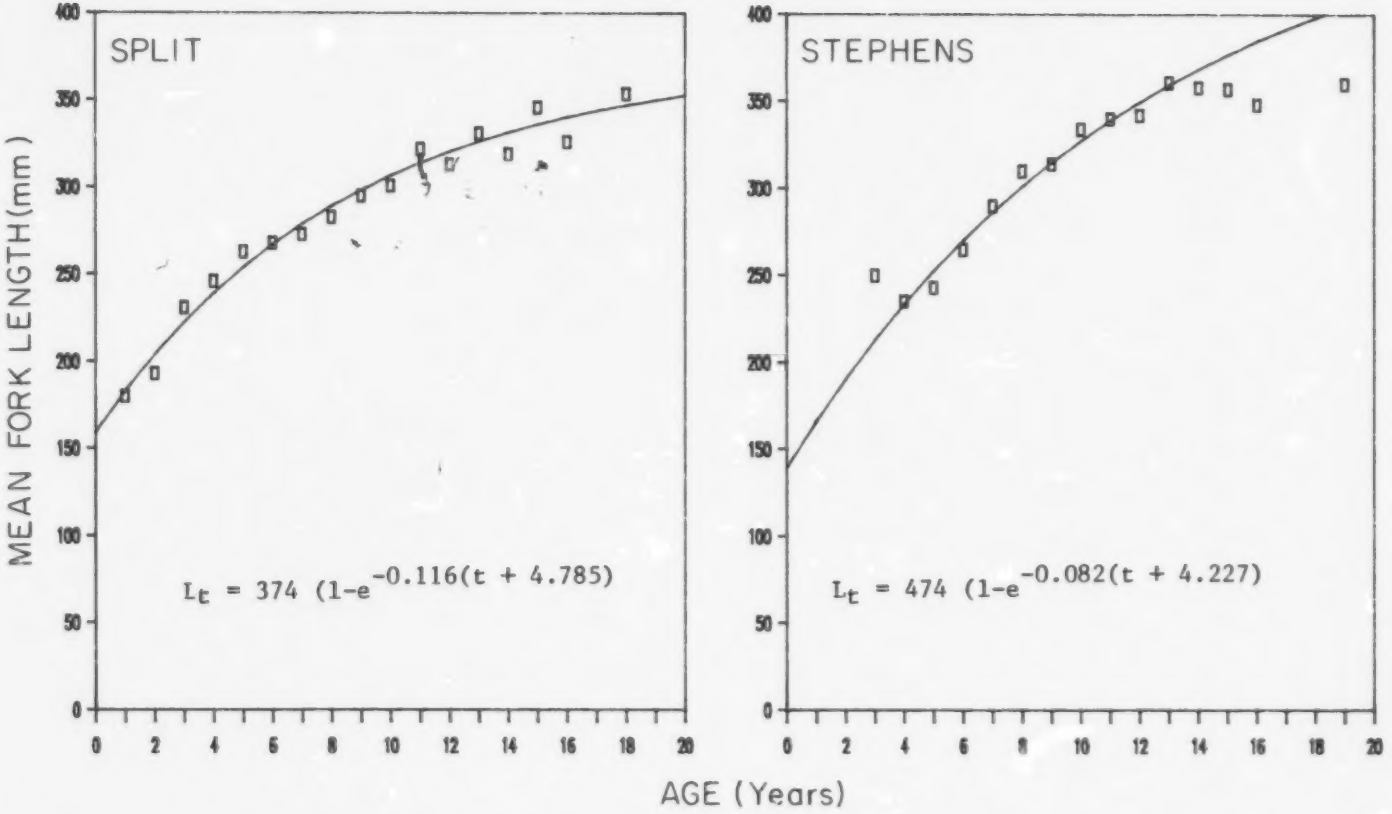

Fig. 25. von Bertalanffy curve for sauger from Split and Stephens lakes, 1989.

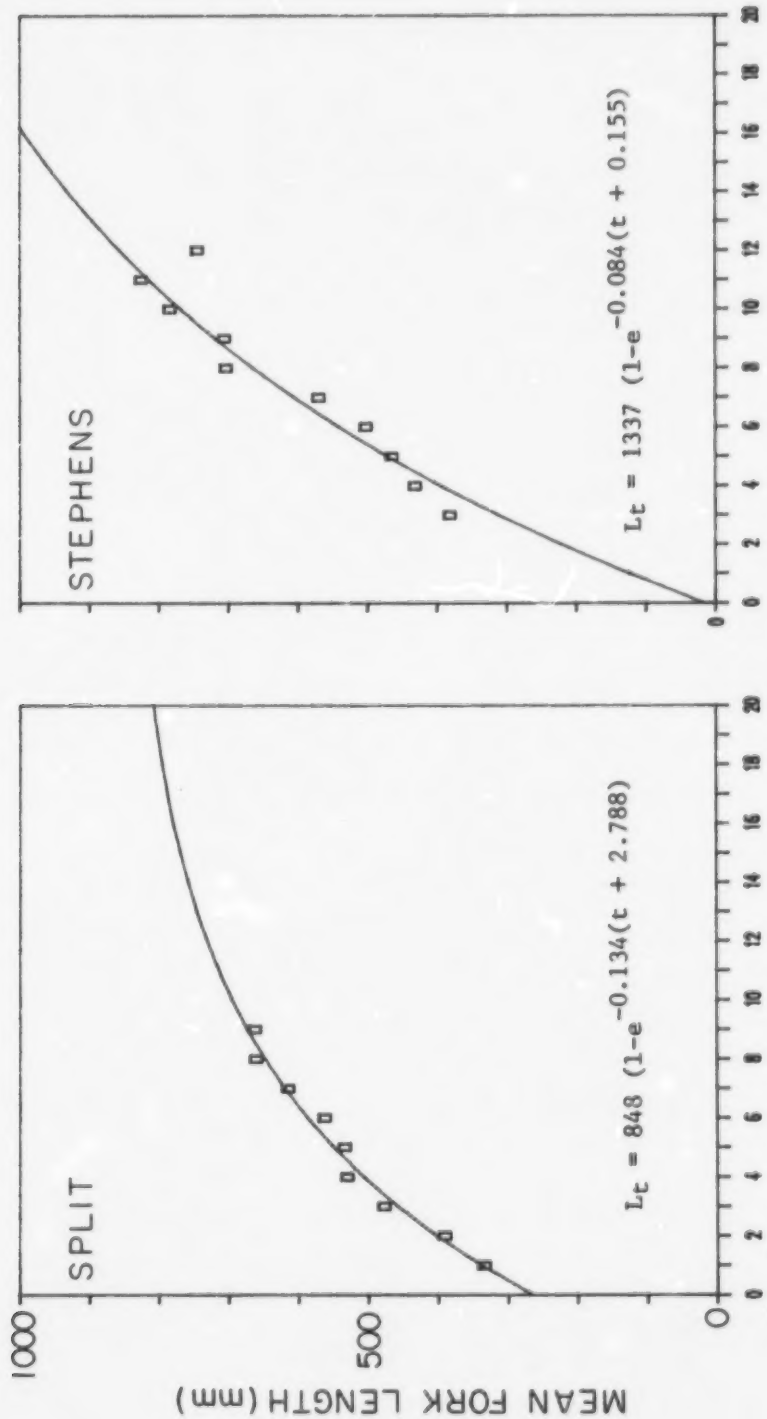

Fig. 26. von Bertalanffy curve for northern pike from Split Lake, 1989.

Table 1. Catch summary for experimental fishing sets in Split Lake, 1989.

Set no.	Date of set	Whitefish	Cisco	Walleye	Sauger	Northern pike	White sucker	Longnose sucker	Shorthead redhorse sucker	Mooneye	Goldeye	Yellow perch	Burbot	Trout perch	Lake chub	Total
1	August 8	42	6	12	15	1	33	4		2				1	3	119
2	"	54	3	18	45	1	24	3		3					4	155
3	"	13	3	15	6	1	24			10					2	74
4	August 9		12	19		8	5			7		21				72
5	"	3	4	15		8	1					14				45
6	August 10		5	8		5	4			1		5				28
7	"	2	2	1		6			1	36		1				49
8	August 11	19			67		62	13					1		6	168
9	"	45	15	1	111		24	1		1					4	202
10	August 21	22	1	5	49	5	10									92
11	"	9	7	23	2		9			31					1	82
12	August 22	1	2	3		5	3			42						56
13	"		1	6	7	2	9									25
14	"	4	4	5	9		13									35
15	August 23	1			3		7	7					1		2	21
16	"	4	16	12		4	7			3						46
17	"	1	7	14	5		8			9		1			1	46
18	August 24	31		3	12		8	1		3	1				2	61
	Total	251	88	160	331	46	251	29	1	148	1	42	2	1	25	1376

Table 2. Catch summary for experimental fishing sets in Stephens Lake, 1989.

Set no.	Date of set	Whitefish	Cisco	Walleye	Sauger	Northern pike	White sucker	Longnose sucker	Mooneye	Yellow perch	Burbot	Trout perch	Lake chub	Total
1	June 12			15	19	1	4	3	1	1				44
2	June 13	1	1	30	1	16	6		139					194
3	"			1	18	1	9	3	27		2			61
4	June 14	1		6	145	1	5	71	1		7			237
5	"	1	2	4	32	1	10	11	23				3	87
6	June 15	8			50		1	31	1		6		1	98
7	"	4	1		15		2	7	2			1		32
8	June 16		15	8	1	1								25
9	"	2	12	9										23
10	June 17	2	9	2		12								25
11	"		3			3								6
12	June 18		4			2								6
13	"		2	1		5								8
14	June 26	4		1	5		2	13						25
15	"	1					2	8			1		3	15
16	June 27	4	5	10	1	16								36
17	"	1	4	2		7								14
18	"	1	10			8								19
19	June 28	1	4	1		4			4					14
20	"							15					1	16
21	"		3	4		2			42				1	52
22	"	3	5	1	1			1	2				8	21
23	June 29	8		7	7		1	28			1	1	3	56
24	"	16	3		4			14			2		1	40
25	"	19	6	2				17	1		2		1	48
26	"	8	1	3	6		2	31	5		1		1	58
27	June 30	4		7		1	1		8					21
28	"	12	1	2	7	1							2	25
29	"	4			11	1	1	1			1			19
30	July 10	27	2	1	2		1	13			1			47
31	"	31						18			3		1	53
32	"	17	5	2	3			10	2		1			40
33	July 11	14		4	4		7	34				1	1	65
34	"	2		2				1					2	7
35	"	6		1	1		2	66			2		3	81
36	July 12	18	1	1	4		1	27	1		2	1	1	57
37	"	27		1				19					2	49
	Total	247	99	128	337	83	57	442	259	1	32	4	35	1724

Table 3. Catches per unit of effort by number and weight and percent frequency of occurrence for fish species caught in Split and Stephens lakes, 1989.

Species	CUE (number/gang/day)		CUE (kg/gang/day)		% frequency of occurrence			
	Split (18)	Stephens (37)	Split	Stephens	Split		Stephens	
					No.	Wt.	No.	Wt.
Whitefish	13.9	6.7	9.3	8.3	18.2	25.6	14.3	27.8
Cisco	4.9	2.7	0.6	0.4	6.4	1.7	5.7	1.5
Walleye	8.9	3.5	5.2	2.7	11.6	14.3	7.4	9.1
Sauger	18.4	9.1	3.8	2.1	24.1	10.5	19.6	7.0
Northern pike	2.6	2.2	2.8	3.5	3.3	7.8	4.8	11.9
White sucker	13.9	1.5	11.9	1.6	18.2	32.9	3.3	5.5
Longnose sucker	1.6	11.9	1.1	9.2	2.1	2.9	25.6	30.9
Shorthead redhorse	0.06		0.06		0.07	0.2		
Mooneye	8.2	7.0	1.1	1.1	10.8	3.1	15.0	3.8
Goldeye	0.06		0.04		0.07	0.1		
Yellow perch	2.3	0.03	0.2	<0.01	3.1	0.5	0.06	<0.01
Burbot	0.1	0.9	0.07	0.7	0.1	0.2	1.9	2.4
Trout perch	0.06	0.1	<0.01	<0.01	0.07	<0.01	0.2	0.01
Lake chub	1.4	0.9	0.08	0.06	1.8	0.2	2.0	0.2
Total	76.4	46.6	36.3	29.7	100.0	100.0	100.0	100.0

Table 4. Sum weights for fish caught in 18 experimental fishing sets in Split Lake, 1989.

Species	Parameter	Mesh size (inches)						
		1.5	2.0	3.0	3.75	4.25	5.0	Total
Whitefish	N	49	49	40	41	54	18	251
	weights	4.89	8.38	28.28	40.84	62.06	22.94	167.38
Cisco	N	57	18	8	4	1		88
	weights	2.84	2.85	3.10	1.70	0.76		11.25
Walleye	N	12	37	46	41	22	2	160
	weights	4.90	11.60	25.68	27.92	21.46	1.84	93.40
Sauger	N	84	171	46	16	5	9	331
	weights	12.24	35.06	13.95	4.73	1.08	1.59	68.66
Northern pike	N	4	12	13	8	7	2	46
	weights	6.64	9.14	10.28	12.82	10.10	1.72	50.70
White sucker	N	29	18	40	67	57	40	251
	weights	1.80	2.63	29.03	61.38	64.04	56.16	215.04
Longnose sucker	N	3	6	7	7	5	1	29
	weights	0.15	3.54	3.57	5.66	5.28	0.82	19.02
Shorthead redhorse sucker	N				1			1
	weights				1.20			1.20
Mooneye	N	26	89	24	7		2	148
	weights	2.05	9.79	5.64	2.06		0.48	20.03
Goldeye	N		1					1
	weights		0.64					0.64
Yellow perch	N	17	25					42
	weights	0.72	2.40					3.12
Burbot	N			2				2
	weights			1.34				1.34
Trout perch	N	1						1
	weights	0.01						0.01
Lake chub	N	24	1					25
	weights	1.38	0.09					1.47
Total	N	306	427	226	192	151	74	1376
	weights	37.63	86.12	120.87	158.31	164.78	85.55	653.26

Table 5. Sum weights for fish caught in 37 experimental fishing sets in Stephens Lake, 1989.

Species	Parameter	Mesh size (inches)						
		1.5	2.0	3.0	3.75	4.25	5.0	Total
Whitefish	N	18	20	36	46	68	59	247
	weights	9.08	20.46	41.10	55.80	89.59	89.72	305.75
Cisco	N	29	41	27	2			99
	weights	2.46	6.41	6.84	0.70			16.41
Walleye	N	14	25	41	30	14	4	128
	weights	8.42	11.97	20.32	35.82	15.76	7.22	99.51
Sauger	N	43	222	60	9		3	337
	weights	7.68	40.15	23.38	4.80		1.04	77.05
Northern pike	N	6	10	38	17	9	3	83
	weights	9.49	12.31	42.36	36.78	20.78	9.10	130.82
White sucker	N	1		10	21	16	9	57
	weights	1.28		6.62	19.13	20.72	12.52	60.27
Longnose sucker	N	21	63	127	131	85	15	442
	weights	11.12	43.76	86.49	104.33	78.73	15.22	339.65
Mooneye	N	61	114	77	4	1	2	259
	weights	8.50	13.59	17.70	0.92	0.22	0.30	41.24
Yellow perch	N		1					1
	weights		0.08					0.08
Burbot	N	1	8	12	6	2	3	32
	weights	0.76	4.24	6.05	5.88	2.08	6.82	25.83
Trout perch	N	3	1					4
	weights	0.09	0.02					0.11
Lake chub	N	30	4	1				35
	weights	1.78	0.40	0.08				2.26
Total	N	227	509	429	266	195	98	1724
	weights	60.67	153.39	250.94	264.16	227.88	141.94	1098.97

Table 6. Mesh size effects on whitefish catches from Split Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	49	49	40	41	54	18	251
CUE (No/100 yds/day)	10.89	10.89	8.89	9.11	12.00	4.00	9.30
CUE (Kg/100 yds/day)	1.09	1.86	6.28	9.08	13.79	5.10	6.20
Mean Length(mm)	178 ± 46.43	221 ± 48.81	352 ± 58.58	390 ± 54.81	408 ± 41.59	421 ± 43.67	316 ± 107.76
Mean Weight(g)	100 ± 132.03	171 ± 182.65	707 ± 375.14	996 ± 446.52	1149 ± 397.17	1274 ± 507.53	667 ± 566.30
No. mat. males	2	4	18	20	35	11	90
No. immat. males	28	20	5	2		1	56
No. mat. females			11	15	15	4	45
No. immat. females	19	25	6	4	4	2	60
% mature (both)	4.1	8.2	72.5	85.4	92.6	83.3	53.8
No. unknown							
Mean age (Years)	2.3	3.1	6.8	7.5	8.3	9.6	5.9
Age(years)	Frequency (%)						
1	4.1						0.8
2	77.6	36.7					22.3
3	10.2	49.0	5.0	2.4			12.7
4	2.0	4.1	7.5	9.8			4.0
5	4.1		45.0	26.8	25.9	5.6	18.3
6		2.0	2.5	9.8	7.4	11.1	4.8
7	2.0	2.0	5.0	7.3	7.4	16.7	5.6
8		6.1	7.5	4.9	3.7	16.7	5.2
9			2.5	7.3	13.0		4.4
10			10.0	12.2	24.1	11.1	9.6
11			7.5	9.8	13.0	11.1	6.4
12			5.0	7.3	3.7	16.7	4.0
13			2.5			5.6	0.8
17				2.4	1.9		0.8
20						5.6	0.4

Total effort for each mesh size was 450 yards of net.

Table 7. Mesh size effects on whitefish catches from Stephens Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	18	20	36	46	68	59	247
CUE (No/100 yds/day)	1.95	2.16	3.89	4.97	7.35	6.38	4.45
CUE (Kg/100 yds/day)	0.98	2.21	4.44	6.03	9.68	9.70	5.51
Mean Length(mm)	259 ± 127.04	357 ± 122.56	401 ± 63.91	419 ± 46.79	428 ± 43.19	446 ± 45.41	409 ± 81.13
Mean Weight(g)	505 ± 627.98	1023 ± 882.63	1142 ± 532.39	1213 ± 493.48	1317 ± 444.25	1521 ± 601.62	1238 ± 613.90
No. mat. males	4	6	23	25	39	36	133
No. immat. males	4	4	3	1	1		13
No. mat. females	4	7	7	20	28	22	88
No. immat. females	6	3	3			1	13
% mature (both)	44.4	65.0	83.3	97.8	98.5	98.3	89.5
No. unknown							
Mean age (Years)	5.6	9.8	9.8	10.0	10.8	12.5	10.5
Age(years)	Frequency (%)						
2	55.6						4.0
3		20.0	2.8				2.0
4	5.6	5.0	2.8				1.2
5	5.6	5.0	8.3	2.2	1.5		2.8
6		10.0		15.2	4.4	1.7	5.3
7		5.0	11.1	13.0	11.8	6.8	9.3
8	11.1	5.0	30.6	17.4	25.0	20.3	20.6
9			2.8	8.7	2.9	5.1	4.0
10	11.1	5.0	8.3	15.2	4.4	10.2	8.9
11		5.0		2.2	7.4	6.8	4.5
12			8.3	4.3	17.6	6.8	8.5
13		15.0	5.6	2.2	4.4		3.6
14			5.6	2.2	5.9	3.4	3.6
15			2.8	2.2		1.7	1.2
16					2.9	1.7	1.2
17		15.0		2.2	1.5	11.9	4.9
18	11.1	10.0	11.1	13.0	10.3	22.0	13.8
19						1.7	0.4

Total effort for each mesh size was 925 yards of net.

Table 8. Mesh size effects on cisco catches from Stephens Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	29	41	27	2			99
CUE (No/100 yds/day)	3.14	4.43	2.92	0.22			1.78
CUE (Kg/100 yds/day)	0.27	0.69	0.74	0.08			0.30
Mean Length(mm)	173 ± 41.36	219 ± 27.60	251 ± 29.20	287 ± 15.56			216 ± 44.94
Mean Weight(g)	85 ± 62.84	156 ± 55.94	253 ± 68.16	350 ± 70.71			166 ± 92.01
No. mat. males	2	9	8	1			20
No. immat. males	3	3	2				8
No. mat. females	1	11	6				18
No. immat. females	4	1	2				7
% mature (both)	30.0	83.3	77.8	100.0			71.7
No. unknown	19	17	9	1			46
Mean age (Years)	3.6	4.7	6.8	12.0			5.3
Age(years)	Frequency (%)						
2	40.0	8.3					11.3
3	20.0	20.8					13.2
4	10.0	25.0					13.2
5			11.1				3.8
6	30.0	37.5	44.4				37.7
7			27.8				9.4
8		8.3	5.6				5.7
10			5.6				1.9
11			5.6				1.9
12				100.0			1.9
Number of unknown ages	19	17	9	1			46

Total effort for each mesh size was 925 yards of net.

Table 9. Mesh size effects on walleye catches from Split Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	12	37	46	41	22	2	160
CUE (No/100 yds/day)	2.67	8.22	10.22	9.11	4.89	0.44	5.93
CUE (Kg/100 yds/day)	1.09	2.58	5.71	6.20	4.77	0.41	3.46
Mean Length(mm)	292 ± 110.27	292 ± 65.97	362 ± 32.64	381 ± 37.09	421 ± 56.92	414 ± 45.25	354 ± 70.52
Mean Weight(g)	409 ± 401.80	313 ± 208.94	558 ± 151.66	681 ± 192.97	975 ± 306.12	920 ± 395.98	584 ± 308.04
No. mat. males	4	8	23	18	9		62
No. immat. males	5	15	5	4			29
No. mat. females	2	7	7	16	13	2	47
No. immat. females	1	7	11	3			22
% mature (both)	50.0	40.5	65.2	82.9	100.0	100.0	68.1
No. unknown							
Mean age (Years)	5.7	5.6	7.3	9.5	12.5	12.0	8.1
Age(years)	Frequency (%)						
1	16.7						1.3
2	33.3	32.4			4.5		10.6
3		5.4					1.3
5		5.4	15.2				5.6
6	16.7	27.0	34.8	22.0			23.1
7		2.7	4.3	4.9			3.1
8		5.4	23.9	19.5	9.1	50.0	15.0
9		2.7	2.2	4.9	4.5		3.1
10	25.0	16.2	17.4	24.4	22.7		20.0
12			2.2	4.9	4.5		2.5
13				7.3	9.1		3.1
14		2.7		2.4	4.5		1.9
15					27.3		3.8
16	8.3			9.8	4.5	50.0	4.4
20					9.1		1.3

Total effort for each mesh size was 450 yards of net.

Table 10. Mesh size effects on walleye catches from Stephens Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	14	25	41	30	14	4	128
CUE (No/100 yds/day)	1.51	2.70	4.43	3.24	1.51	0.43	2.31
CUE (Kg/100 yds/day)	0.91	1.29	2.20	3.87	1.70	0.78	1.79
Mean Length(mm)	340 ± 102.69	332 ± 64.57	340 ± 47.03	447 ± 70.20	448 ± 49.11	521 ± 40.64	381 ± 85.59
Mean Weight(g)	601 ± 460.27	479 ± 365.15	496 ± 266.03	1194 ± 581.32	1126 ± 439.33	1805 ± 449.70	777 ± 552.36
No. mat. males	4	5	11	9	5		34
No. immat. males	4	6	8				18
No. mat. females	2	3	7	18	7	3	40
No. immat. females	4	11	15	3	2	1	36
% mature (both)	42.9	32.0	43.9	90.0	85.7	75.0	57.8
No. unknown							
Mean age (Years)	8.7	7.8	7.5	13.6	13.2	14.8	10.0
Age(years)	Frequency (%)						
2	14.3						1.6
4	7.1						0.8
5	14.3	12.0	2.4				4.7
6	7.1	64.0	61.0	3.3			33.6
7	7.1		9.8	3.3	7.1		5.5
8	7.1	4.0	12.2	10.0	7.1		8.6
10		4.0		10.0	14.3		4.7
12	7.1		4.9	3.3	14.3	25.0	5.5
13	14.3		2.4	13.3	21.4		7.8
14			2.4	13.3	7.1		4.7
15	21.4	4.0		13.3	7.1	25.0	7.8
16		4.0	2.4	10.0	14.3	50.0	7.0
17				3.3			0.8
18		8.0		3.3			2.3
19			2.4	10.0			3.1
20				3.3			0.8
26					7.1		0.8

Total effort for each mesh size was 925 yards of net.

Table 11. Mesh size effects on sauger catches from Split Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	84	171	46	16	5	9	331
CUE (No/100 yds/day)	18.67	38.00	10.22	3.56	1.11	2.00	12.26
CUE (Kg/100 yds/day)	2.72	7.79	3.10	1.05	0.24	0.35	2.54
Mean Length(mm)	237 ± 44.41	269 ± 29.35	302 ± 40.42	290 ± 48.30	274 ± 21.97	250 ± 34.18	266 ± 41.70
Mean Weight(g)	146 ± 81.81	205 ± 71.04	303 ± 114.93	296 ± 142.50	216 ± 71.27	177 ± 83.40	207 ± 99.48
No. mat. males	16	65	15	3	2	3	104
No.immat. males	24	14	2	2		1	43
No. mat. females	12	60	22	6	1	2	103
No. immat. females	20	22	3	3	1	3	52
% mature (both)	38.9	77.6	88.1	64.3	75	55.6	68.5
No. unknown	12	10	4	2	1		29
Mean age (Years)	4.5	6.6	9.8	6.8	7.3	5.0	6.5
Age(years)	Frequency (%)						
1	2.8						0.7
2	36.1	3.8	2.4	8.3		22.2	12.0
3		3.1		8.3			2.0
4	1.4	0.6	2.4			22.2	1.7
5	8.3	14.4	4.8				10.4
6	36.1	40.6	31.0	33.3	75.0	44.4	38.5
7	6.9	8.8	4.8	16.7			7.7
8	8.3	13.1	9.5	16.7			11.0
9		10.0	4.8			11.1	5.7
10		3.1		8.3			2.0
11			7.1		25.0		1.3
12			2.4	8.3			0.7
13		1.9	2.4				1.3
14		0.6	2.4				0.7
15			14.3				2.0
16			4.8				0.7
18			4.8				0.7
22			0.3				0.3
Number of unknown ages	12	11	4	4	1		32

Total effort for each mesh size was 450 yards of net.

Table 12. Mesh size effects on sauger catches from Stephens Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	43	222	60	9		3	337
CUE (No/100 yds/day)	4.65	24.00	6.49	0.97		0.32	6.07
CUE (Kg/100 yds/day)	0.83	4.34	2.53	0.52		0.11	1.39
Mean Length(mm)	262 ± 29.79	263 ± 27.25	329 ± 23.32	359 ± 19.39		323 ± 19.22	278 ± 39.19
Mean Weight(g)	179 ± 78.80	181 ± 67.89	390 ± 81.05	533 ± 70.71		347 ± 80.83	229 ± 119.12
No. mat. males	32	176	16	1			225
No. immat. males		7					7
No. mat. females	7	29	43	8		3	90
No. immat. females	4	10	1				15
% mature (both)	90.7	92.3	98.3	100.0		100.0	93.5
No. unknown							
Mean age (Years)	6.1	6.2	9.2	11.7		7.3	6.9
Age(years)	Frequency (%)						
3	2.3						0.3
4	7.0	2.7					2.7
5	25.6	22.5	1.7				18.4
6	46.5	55.0	16.7				45.1
7	7.0	8.1	5.0			66.7	7.7
8	4.7	5.9	33.3	11.1		33.3	11.0
9		1.8	6.7	11.1			2.7
10		0.5	10.0	22.2			2.7
11	2.3	0.9	6.7				2.1
12	4.7	1.4	6.7	22.2			3.3
13			5.0				0.9
14			3.3	11.1			0.9
15		0.9	1.7	22.2			1.5
16		0.5	1.7				0.6
19			1.7				0.3

Total effort for each mesh size was 925 yards of net.

Table 13. Mesh size effects on northern pike catches from Split Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	4	12	13	8	7	2	46
CUE (No/100 yds/day)	0.89	2.67	2.89	1.78	1.56	0.44	1.70
CUE (Kg/100 yds/day)	1.48	2.03	2.28	2.85	2.24	0.38	1.88
Mean Length(mm)	592 ± 91.56	442 ± 114.81	480 ± 58.11	606 ± 55.81	544 ± 152.36	508 ± 65.05	513 ± 110.58
Mean Weight(g)	1660 ± 789.09	762 ± 727.91	791 ± 165.85	1603 ± 606.95	1443 ± 878.52	860 ± 311.13	1102 ± 701.77
No. mat. males	2	6	6	3	2	1	20
No. immat. males					1		1
No. mat. females	2	5	4	5	4	1	21
No. immat. females		1	3				4
% mature (both)	100.0	91.7	76.9	100.0	85.7	100.0	89.1
No. unknown							
Mean age (Years)	6.8	3.3	4.2	5.4	4.3	4.0	4.4
Age(years)	Frequency (%)						
1					28.6		4.3
2		41.7	7.7			50.0	15.2
3		25.0	38.5	37.5			23.9
4		8.3	23.1		14.3		10.9
5	25.0	16.7	7.7	25.0	28.6		17.4
6	25.0		7.7			50.0	6.5
7	25.0	8.3	15.4	12.5	28.6		15.2
8				12.5			2.2
9	25.0			12.5			4.3

Total effort for each mesh size was 450 yards of net.

Table 14. Mesh size effects on northern pike catches from Stephens Lake, 1989.

	Mesh size (inches)						
	1.50	2.00	3.00	3.75	4.25	5.00	Total
Number caught	6	10	38	17	9	3	83
CUE (No/100 yds/day)	0.65	1.08	4.11	1.84	0.97	0.32	1.50
CUE (Kg/100 yds/day)	1.03	1.33	4.58	3.98	2.25	0.98	2.36
Mean Length(mm)	552 ± 208.24	510 ± 158.76	513 ± 117.93	612 ± 172.53	684 ± 92.27	790 ± 87.84	564 ± 154.98
Mean Weight(g)	1582 ±1906.61	1231 ±1195.07	1115 ± 994.46	2164 ±1886.31	2309 ± 761.12	3033 ± 654.32	1576 ±1381.02
No. mat. males	1	4	15	9	1		30
No. immat. males							
No. mat. females	3	3	11	5	5	3	30
No. immat. females	2	3	12	3	3		23
% mature (both)	66.7	70.0	68.4	82.4	66.7	100.0	72.3
No. unknown							
Mean age (Years)	6.6	4.9	5.9	7.2	8.4	11.0	6.6
Age(years)	Frequency (%)						
3		11.1	2.6				2.5
4	20.0	44.4	23.7	17.6			21.0
5	20.0	33.3	34.2	11.8			23.5
6	20.0		15.8	11.8	22.2		13.6
7			2.6	17.6			4.9
8	20.0		5.3	5.9	33.3		8.6
9			5.3	11.8	22.2		7.2
10	20.0	11.1	5.3	17.6	11.1	33.3	11.1
11			2.6	5.9		33.3	3.7
12			2.6		11.1	33.3	3.7
Number of unknown ages	1	1					2

Total effort for each mesh size was 925 yards of net.

Table 15. Mesh size effects on white, longnose and shorthead redhorse sucker catches from Split Lake, 1989.

		Mesh size (inches)						
		1.50	2.00	3.00	3.75	4.25	5.00	Total
White sucker	Number caught	29	18	40	67	57	40	251
	CUE (No/100 yds/day)	6.44	4.00	8.89	14.89	12.67	8.89	9.30
	CUE (Kg/100 yds/day)	0.40	0.58	6.45	13.64	14.23	12.48	7.96
	Mean Length(mm)	160 ± 11.29	211 ± 28.99	353 ± 56.25	385 ± 34.97	413 ± 25.44	443 ± 29.99	357 ± 96.63
	Mean Weight(g)	62 ±	146 ±	726 ±	916 ±	1124 ±	1404 ±	857 ±
Longnose sucker	Number caught	3	6	7	7	5	1	29
	CUE (No/100 yds/day)	0.67	1.33	1.56	1.56	1.11	0.22	1.07
	CUE (Kg/100 yds/day)	0.03	0.79	0.79	1.26	1.17	0.18	0.70
	Mean Length(mm)	151 ± 5.03	343 ± 80.30	320 ± 73.04	402 ± 18.81	428 ± 21.93	390 ±	348 ± 93.31
	Mean Weight(g)	50 ±	590 ±	510 ±	809 ±	1056 ±	820 ±	656 ±
Shorthead redhorse sucker	Number caught				1			1
	CUE (No/100 yds/day)				0.22			0.04
	CUE (Kg/100 yds/day)				0.27			0.04
	Mean Length(mm)				414 ±			414 ±
	Mean Weight(g)				1200 ±			1200 ±

Total effort for each mesh size was 450 yards of net

Table 16. Mesh size effects on white sucker, longnose sucker and mooneye catches from Stephens Lake, 1989.

		Mesh size (inches)						
		1.50	2.00	3.00	3.75	4.25	5.00	Total
White sucker	Number caught	1		10	21	16	9	57
	CUE (No/100 yds/day)	0.11		1.08	2.27	1.73	0.97	1.03
	CUE (Kg/100 yds/day)	0.14		0.72	2.07	2.24	1.35	1.09
	Mean Length(mm)	436 ±		340 ± 46.84	386 ± 31.89	430 ± 30.85	440 ± 24.77	400 ± 48.03
	Mean Weight(g)	1280 ±		662 ±	911 ±	1295 ±	1391 ±	1057 ±
Longnose sucker	Number caught	21	63	127	131	85	15	442
	CUE (No/100 yds/day)	2.27	6.81	13.73	14.16	9.19	1.62	7.96
	CUE (Kg/100 yds/day)	1.20	4.73	9.35	11.28	8.51	1.65	6.12
	Mean Length(mm)	330 ± 75.56	369 ± 44.42	365 ± 37.18	386 ± 30.75	410 ± 25.73	421 ± 27.13	381 ± 42.46
	Mean Weight(g)	530 ±	695 ±	681 ±	796 ±	926 ±	1015 ±	768 ±
Mooneye	Number caught	21	63	127	131	85	15	442
	CUE (No/100 yds/day)	2.27	6.81	13.73	14.16	9.19	1.62	7.96
	CUE (Kg/100 yds/day)	1.20	4.73	9.35	11.28	8.51	1.65	6.12
	Mean Length(mm)	330 ± 75.56	369 ± 44.42	365 ± 37.18	386 ± 30.75	410 ± 25.73	421 ± 27.13	381 ± 42.46
	Mean Weight(g)	530 ±	695 ±	681 ±	796 ±	926 ±	1015 ±	768 ±

Total effort for each mesh size was 925 yards of net

Table 17. Mesh size effects on cisco, mooneye, goldeye and burbot catches from Split Lake, 1989.

		Mesh size (inches)						
		1.50	2.00	3.00	3.75	4.25	5.00	Total
Cisco	Number caught	57	18	8	4	1		88
	CUE (No/100 yds/day)	12.67	4.00	1.78	0.89	0.22		3.26
	CUE (Kg/100 yds/day)	0.63	0.63	0.69	0.38	0.17		0.42
	Mean Length(mm)	149 ± 23.17	227 ± 31.88	296 ± 35.08	306 ± 17.46	372 ±		188 ± 63.79
	Mean Weight(g)	50 ±	158 ±	388 ± 54.76	425 ±	760 ±		128 ± 16.07
Mooneye	Number caught	26	89	24	7		2	148
	CUE (No/100 yds/day)	5.78	19.78	5.33	1.56		0.44	5.48
	CUE (Kg/100 yds/day)	0.46	2.18	1.25	0.46		0.11	0.74
	Mean Length(mm)	179 ± 31.91	203 ± 21.58	260 ± 26.23	277 ± 8.22		267 ± 26.87	212 ± 37.88
	Mean Weight(g)	79 ±	110 ±	235 ±	294 ±		240 ±	135 ±
Goldeye	Number caught		1					1
	CUE (No/100 yds/day)		0.22					0.04
	CUE (Kg/100 yds/day)		0.14					0.02
	Mean Length(mm)		364 ±					364 ± -
	Mean Weight(g)		640 ±					640 ± -
Burbot	Number caught			2				2
	CUE (No/100 yds/day)			0.44				0.07
	CUE (Kg/100 yds/day)			0.30				0.05
	Mean Length(mm)			466 ± 76.37				466 ± 76.37
	Mean Weight(g)			670 ±				670 ±

Total effort for each mesh size was 450 yards of net.

Table 18. Mesh size effects on yellow perch, trout perch, lake chub and burbot catches from Stephens Lake, 1989.

		Mesh size (inches)						
		1.50	2.00	3.00	3.75	4.25	5.00	Total
Yellow perch	Number caught		1					1
	CUE (No/100 yds/day)		0.11					0.02
	CUE (Kg/100 yds/day)		0.01					0.00
	Mean Length(mm)		186 ±					186 ±
	Mean Weight(g)		80 ±					80 ±
Trout perch	Number caught	3	1					4
	CUE (No/100 yds/day)	0.32	0.11					0.07
	CUE (Kg/100 yds/day)	0.01	0.00					0.00
	Mean Length(mm)	96 ± 21.07	120 ±					102 ± 20.98
	Mean Weight(g)	30 ±	20 ±					28 ±
Lake chub	Number caught	30	4	1				35
	CUE (No/100 yds/day)	3.24	0.43	0.11				0.63
	CUE (Kg/100 yds/day)	0.19	0.04	0.01				0.04
	Mean Length(mm)	164 ± 10.87	196 ± 9.93	176 ±				168 ± 14.72
	Mean Weight(g)	59 ±	100 ±	80 ±				65 ±
Burbot	Number caught	1	8	12	6	2	3	32
	CUE (No/100 yds/day)	0.11	0.86	1.30	0.65	0.22	0.32	0.58
	CUE (Kg/100 yds/day)	0.08	0.46	0.65	0.64	0.22	0.74	0.47
	Mean Length(mm)	490 ±	372 ± 141.30	416 ± 30.25	509 ± 76.15	515 ± 63.64	663 ± 70.24	454 ± 116.62
	Mean Weight(g)	760 ±	530 ±	504 ±	980 ±	1040 ±	2273 ±	807 ±

Total effort for each mesh size was 925 yards of net

Table 19. Mesh size effects on yellow perch, trout perch and lake chub catches from Split Lake, 1989.

		Mesh size (inches)						
		1.50	2.00	3.00	3.75	4.25	5.00	Total
Yellow perch	Number caught	17	25					42
	CUE (No/100 yds/day)	3.78	5.56					1.56
	CUE (Kg/100 yds/day)	0.16	0.53					0.12
	Mean Length(mm)	136 ± 20.48	183 ± 23.58					164 ± 32.40
	Mean Weight(g)	42 ±	96 ±					74 ±
Trout perch	Number caught	1						1
	CUE (No/100 yds/day)	0.22						0.04
	CUE (Kg/100 yds/day)	0.00						0.00
	Mean Length(mm)	74 ±						74 ±
	Mean Weight(g)	10 ±						10 ±
Lake chub	Number caught	24	1					25
	CUE (No/100 yds/day)	5.33	0.22					0.93
	CUE (Kg/100 yds/day)	0.31	0.02					0.05
	Mean Length(mm)	164 ± 10.32	186 ±					164 ± 11.06
	Mean Weight(g)	57 ±	90 ±					59 ±

Total effort for each mesh size was 450 yards of net

Table 20. Age specific size and maturity conditions of whitefish from Split Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
	1	2	0	0.0	125 ± 7.07	40 ± 0.00	2.07
Males	2	34	0	0.0	172 ± 19.68	68 ± 22.36	1.31
	3	14	1	7.1	230 ± 25.22	163 ± 59.67	1.29
	4	6	3	50.0	301 ± 37.26	417 ± 161.20	1.45
	5	28	26	92.9	349 ± 38.12	646 ± 261.40	1.46
	6	8	7	87.5	368 ± 24.88	763 ± 176.13	1.51
	7	8	8	100.0	367 ± 40.86	805 ± 229.72	1.56
	8	8	7	87.5	367 ± 65.21	870 ± 418.84	1.59
	9	6	6	100.0	417 ± 20.03	1193 ± 196.23	1.63
	10	17	17	100.0	420 ± 22.37	1225 ± 214.30	1.65
	11	8	8	100.0	423 ± 41.84	1245 ± 380.94	1.59
	12	5	5	100.0	446 ± 25.82	1372 ± 356.26	1.53
	17	2	2	100.0	474 ± 5.66	1810 ± 14.14	1.70
Total		146	90	61.6	315 ± 104.35	638 ± 514.45	1.47
Females	2	22	0	0.0	172 ± 12.98	73 ± 23.19	1.40
	3	18	0	0.0	217 ± 36.56	150 ± 80.96	1.36
	4	4	0	0.0	288 ± 43.97	325 ± 147.31	1.29
	5	18	8	44.4	352 ± 22.13	660 ± 149.67	1.50
	6	4	3	75.0	369 ± 40.55	810 ± 335.66	1.54
	7	6	5	83.3	428 ± 12.84	1340 ± 57.97	1.72
	8	5	3	60.0	356 ± 88.90	868 ± 559.75	1.61
	9	5	5	100.0	427 ± 24.23	1340 ± 277.49	1.70
	10	7	7	100.0	439 ± 23.43	1409 ± 190.04	1.66
	11	8	8	100.0	440 ± 17.74	1423 ± 237.47	1.66
	12	5	4	80.0	420 ± 91.73	1336 ± 708.15	1.61
	13	2	2	100.0	480 ± 8.49	1750 ± 42.43	1.58
	20	1	0	0.0	542 ± -	2960 ± -	1.86
Total		105	45	42.9	317 ± 112.83	706 ± 631.80	1.51
	1	2	0	0.0	125 ± 7.07	40 ± 0.00	2.07
Both	2	56	0	0.0	172 ± 17.23	70 ± 22.59	1.34
	3	32	1	3.1	223 ± 32.37	155 ± 71.64	1.33
	4	10	3	30.0	296 ± 38.25	380 ± 154.63	1.38
	5	46	34	73.9	350 ± 32.54	652 ± 222.49	1.47
	6	12	10	83.3	368 ± 29.03	778 ± 225.87	1.52
	7	14	13	92.9	393 ± 44.00	1034 ± 324.34	1.63
	8	13	10	76.9	363 ± 71.71	869 ± 454.72	1.59
	9	11	11	100.0	422 ± 21.49	1260 ± 236.47	1.66
	10	24	24	100.0	425 ± 23.92	1278 ± 220.59	1.65
	11	16	16	100.0	431 ± 32.26	1334 ± 320.06	1.62
	12	10	9	90.0	433 ± 64.95	1354 ± 528.82	1.57
	13	2	2	100.0	480 ± 8.49	1750 ± 42.43	1.58
	17	2	2	100.0	474 ± 5.66	1810 ± 14.14	1.70
	20	1	0	0.0	542 ± -	2960 ± -	1.86
Total		251	135	53.8	316 ± 107.76	667 ± 566.30	1.49

± = standard deviation
Number of fish with unknown age that were excluded = 0
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 21. Age specific size and maturity conditions of whitefish from Stephens Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
Males	2	4	0	0.0	157 ± 13.70	59 ± 18.86	1.48
	3	3	1	33.3	215 ± 21.39	140 ± 52.92	1.36
	5	6	3	50.0	318 ± 78.37	563 ± 373.61	1.48
	6	10	8	80.0	358 ± 52.40	808 ± 390.46	1.62
	7	10	9	90.0	394 ± 35.43	982 ± 261.53	1.57
	8	27	26	96.3	396 ± 32.26	1021 ± 279.87	1.59
	9	6	6	100.0	416 ± 14.50	1180 ± 189.31	1.62
	10	16	16	100.0	412 ± 19.47	1111 ± 194.18	1.58
	11	9	9	100.0	441 ± 22.74	1393 ± 323.88	1.60
	12	13	13	100.0	435 ± 18.88	1348 ± 161.36	1.64
	13	6	6	100.0	437 ± 17.10	1350 ± 206.59	1.60
	14	6	6	100.0	453 ± 36.78	1537 ± 431.08	1.62
	15	2	2	100.0	444 ± 2.83	1350 ± 42.43	1.54
	16	1	1	100.0	504 ± -	2400 ± -	1.87
	17	5	5	100.0	486 ± 22.93	2028 ± 465.32	1.75
	18	22	22	100.0	482 ± 22.31	1900 ± 389.29	1.67
Total		146	133	91.1	410 ± 73.17	1225 ± 543.80	1.61
Females	2	6	0	0.0	157 ± 11.71	55 ± 15.17	1.39
	3	2	1	50.0	197 ± 12.73	100 ± 28.28	1.29
	4	3	1	33.3	241 ± 24.11	200 ± 72.11	1.37
	5	1	0	0.0	362 ± -	680 ± -	1.43
	6	3	2	66.7	361 ± 56.58	700 ± 290.52	1.43
	7	13	13	100.0	401 ± 22.81	1066 ± 198.73	1.64
	8	24	22	91.7	400 ± 24.51	1056 ± 252.36	1.63
	9	4	4	100.0	418 ± 32.54	1280 ± 547.72	1.68
	10	6	6	100.0	421 ± 22.90	1200 ± 311.90	1.57
	11	2	2	100.0	442 ± 28.28	1320 ± 311.13	1.51
	12	8	8	100.0	434 ± 35.08	1328 ± 454.68	1.58
	13	3	3	100.0	481 ± 30.09	2127 ± 777.77	1.85
	14	3	3	100.0	465 ± 17.47	1653 ± 50.33	1.65
	15	1	1	100.0	420 ± -	1300 ± -	1.75
	16	2	2	100.0	490 ± 8.49	1740 ± 254.56	1.47
	17	7	7	100.0	489 ± 23.94	1960 ± 408.90	1.66
	18	12	12	100.0	503 ± 45.71	2208 ± 795.74	1.67
	19	1	1	100.0	490 ± -	1940 ± -	1.65
Total		101	88	87.1	407 ± 91.78	1257 ± 705.47	1.60
Both	2	10	0	0.0	157 ± 11.79	56 ± 15.80	1.43
	3	5	2	40.0	208 ± 19.24	124 ± 45.61	1.33
	4	3	1	33.3	241 ± 24.11	200 ± 72.11	1.37
	5	7	3	42.9	324 ± 73.49	580 ± 343.90	1.47
	6	13	10	76.9	358 ± 50.94	783 ± 361.46	1.58
	7	23	22	95.7	398 ± 28.48	1030 ± 226.58	1.61
	8	51	48	94.1	398 ± 28.65	1037 ± 265.21	1.61
	9	10	10	100.0	417 ± 21.69	1220 ± 350.11	1.65
	10	22	22	100.0	415 ± 20.34	1135 ± 227.44	1.58
	11	11	11	100.0	441 ± 22.22	1380 ± 307.38	1.58
	12	21	21	100.0	435 ± 25.40	1340 ± 296.78	1.62
	13	9	9	100.0	452 ± 29.88	1609 ± 573.33	1.69
	14	9	9	100.0	457 ± 31.02	1576 ± 346.67	1.63
	15	3	3	100.0	436 ± 14.00	1333 ± 41.63	1.61
	16	3	3	100.0	495 ± 10.07	1960 ± 421.43	1.61
	17	12	12	100.0	488 ± 22.50	1988 ± 413.72	1.70
	18	34	34	100.0	490 ± 33.37	2009 ± 574.34	1.67
	19	1	1	100.0	490 ± -	1940 ± -	1.65
Total		247	221	89.5	409 ± 81.13	1238 ± 613.90	1.60

± = standard deviation
Number of fish with unknown age that were excluded = 0
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 22. Age specific size and maturity conditions of cisco from Stephens Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± (mm)	s.d.	Wt ± (g)	s.d.	Mean Condition Factor
Males	2	1	0	0.0	146 ±	-	50 ±	-	1.61
	3	5	1	20.0	179 ±	21.66	90 ±	44.05	1.45
	4	4	3	75.0	201 ±	27.78	125 ±	64.03	1.46
	5	1	1	100.0	228 ±	-	180 ±	-	1.52
	6	10	9	90.0	242 ±	18.02	210 ±	30.18	1.49
	7	3	2	66.7	266 ±	24.25	300 ±	131.15	1.52
	8	3	3	100.0	247 ±	6.11	227 ±	23.09	1.51
	12	1	1	100.0	298 ±	-	400 ±	-	1.51
Total		28	20	71.4	226 ±	39.54	188 ±	93.94	1.49
Females	2	5	2	40.0	171 ±	27.37	86 ±	43.36	1.62
	3	2	2	100.0	197 ±	24.04	95 ±	35.36	1.21
	4	3	2	66.7	188 ±	15.10	100 ±	34.64	1.46
	5	1	0	0.0	242 ±	-	200 ±	-	1.41
	6	10	8	80.0	236 ±	17.43	184 ±	33.73	1.41
	7	2	2	100.0	267 ±	12.73	260 ±	28.28	1.36
	10	1	1	100.0	272 ±	-	260 ±	-	1.29
	11	1	1	100.0	310 ±	-	440 ±	-	1.48
Total		25	18	72.0	221 ±	41.37	167 ±	87.39	1.44
Both	2	6	2	33.3	167 ±	26.56	80 ±	41.47	1.62
	3	7	3	42.9	184 ±	22.01	92 ±	38.82	1.38
	4	7	5	71.4	195 ±	22.51	114 ±	51.27	1.46
	5	2	1	50.0	235 ±	9.90	190 ±	14.14	1.46
	6	20	17	85.0	239 ±	17.59	197 ±	33.89	1.45
	7	5	4	80.0	266 ±	18.30	284 ±	96.33	1.46
	8	3	3	100.0	247 ±	6.11	227 ±	23.09	1.51
	10	1	1	100.0	272 ±	-	260 ±	-	1.29
	11	1	1	100.0	310 ±	-	440 ±	-	1.48
	12	1	1	100.0	298 ±	-	400 ±	-	1.51
Total		53	38	71.7	224 ±	40.10	178 ±	90.64	1.47

± = standard deviation
Number of fish with unknown age that were excluded = 46
Number of fish with unknown sex that were excluded = 46
Number of fish with unknown mat that were excluded = 46

Table 23. Age specific size and maturity conditions of walleye from Split Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
	1	2	1	50.0	165 ± 9.90	42 ± 8.49	0.93
Males	2	16	4	25.0	217 ± 11.72	105 ± 17.65	1.03
	5	5	3	60.0	318 ± 40.65	348 ± 122.15	1.05
	6	20	12	60.0	333 ± 35.39	434 ± 109.76	1.17
	7	4	4	100.0	366 ± 19.53	565 ± 99.83	1.14
	8	15	10	66.7	366 ± 23.61	579 ± 126.82	1.16
	9	3	3	100.0	375 ± 7.57	627 ± 83.27	1.18
	10	14	13	92.9	375 ± 21.57	650 ± 145.44	1.21
	12	1	1	100.0	324 ± -	460 ± -	1.35
	13	3	3	100.0	423 ± 31.26	973 ± 241.11	1.26
	14	2	2	100.0	399 ± 12.73	800 ± 28.28	1.27
	15	2	2	100.0	412 ± 28.28	970 ± 240.42	1.37
	16	4	4	100.0	412 ± 30.70	845 ± 208.09	1.19
Total		91	62	68.1	332 ± 70.64	488 ± 268.61	1.15
Females	2	1	0	0.0	216 ± -	120 ± -	1.19
	3	2	0	0.0	226 ± 14.14	130 ± 14.14	1.15
	5	4	0	0.0	338 ± 13.37	445 ± 34.16	1.15
	6	17	4	23.5	339 ± 27.05	454 ± 115.92	1.14
	7	1	0	0.0	362 ± -	640 ± -	1.35
	8	9	9	100.0	396 ± 25.43	751 ± 169.15	1.19
	9	2	2	100.0	415 ± 21.21	850 ± 98.99	1.19
	10	18	18	100.0	417 ± 42.20	883 ± 264.64	1.20
	12	3	3	100.0	419 ± 33.13	960 ± 300.00	1.27
	13	2	2	100.0	398 ± 33.94	790 ± 296.98	1.22
	14	1	0	0.0	388 ± -	600 ± -	1.03
	15	4	4	100.0	458 ± 34.96	1155 ± 261.98	1.19
	16	3	3	100.0	407 ± 72.23	887 ± 411.99	1.24
	20	2	2	100.0	430 ± 25.46	890 ± 127.28	1.12
Total		69	47	68.1	383 ± 59.66	710 ± 312.85	1.18
	1	2	1	50.0	165 ± 9.90	42 ± 8.49	0.93
Both	2	17	4	23.5	217 ± 11.35	106 ± 17.48	1.04
	3	2	0	0.0	226 ± 14.14	130 ± 14.14	1.15
	5	9	3	33.3	327 ± 31.76	391 ± 102.52	1.09
	6	37	16	43.2	336 ± 31.55	443 ± 111.51	1.16
	7	5	4	80.0	365 ± 17.01	580 ± 92.74	1.18
	8	24	19	79.2	378 ± 28.00	643 ± 164.36	1.17
	9	5	5	100.0	391 ± 24.76	716 ± 144.50	1.18
	10	32	31	96.9	399 ± 40.28	781 ± 247.20	1.20
	12	4	4	100.0	396 ± 54.81	835 ± 350.00	1.29
	13	5	5	100.0	413 ± 31.13	900 ± 247.39	1.25
	14	3	2	66.7	395 ± 11.02	733 ± 117.19	1.19
	15	6	6	100.0	442 ± 38.02	1093 ± 248.73	1.25
	16	7	7	100.0	410 ± 47.07	863 ± 280.58	1.21
	20	2	2	100.0	430 ± 25.46	890 ± 127.28	1.12
Total		160	109	68.1	354 ± 70.52	584 ± 308.04	1.16

± = standard deviation
Number of fish with unknown age that were excluded = 0
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 24. Age specific size and maturity conditions of walleye from Stephens Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
Males	2	1	0	0.0	146 ± -	60 ± -	1.93
	5	3	0	0.0	277 ± 18.04	240 ± 52.92	1.11
	6	20	7	35.0	306 ± 13.71	337 ± 46.92	1.17
	7	3	2	66.7	357 ± 13.01	527 ± 23.09	1.16
	8	5	5	100.0	361 ± 19.73	568 ± 83.19	1.20
	10	1	1	100.0	372 ± -	700 ± -	1.36
	12	4	4	100.0	405 ± 32.27	775 ± 151.77	1.16
	13	5	5	100.0	416 ± 6.07	864 ± 21.91	1.20
	14	1	1	100.0	370 ± -	540 ± -	1.07
	15	5	5	100.0	413 ± 25.32	916 ± 185.69	1.29
	16	3	3	100.0	432 ± 20.30	987 ± 133.17	1.22
	17	1	1	100.0	406 ± -	980 ± -	1.46
Total		52	34	65.4	350 ± 60.75	560 ± 276.50	1.21
Females	2	1	0	0.0	176 ± -	80 ± -	1.47
	4	1	0	0.0	284 ± -	240 ± -	1.05
	5	3	0	0.0	287 ± 20.53	253 ± 50.33	1.06
	6	23	2	8.7	318 ± 20.50	374 ± 64.16	1.16
	7	4	1	25.0	381 ± 22.53	660 ± 134.66	1.19
	8	6	2	33.3	358 ± 32.97	573 ± 160.33	1.23
	10	5	3	60.0	399 ± 46.27	768 ± 256.36	1.17
	12	3	3	100.0	437 ± 47.26	1060 ± 280.00	1.26
	13	5	5	100.0	456 ± 41.59	1224 ± 327.84	1.26
	14	5	5	100.0	496 ± 54.47	1508 ± 521.27	1.20
	15	5	5	100.0	501 ± 26.48	1604 ± 335.38	1.26
	16	6	5	83.3	488 ± 51.14	1477 ± 526.03	1.22
	18	3	3	100.0	497 ± 12.22	1487 ± 128.58	1.21
	19	4	4	100.0	548 ± 31.30	2140 ± 301.99	1.30
	20	1	1	100.0	530 ± -	1780 ± -	1.20
	26	1	1	100.0	560 ± -	2260 ± -	1.29
Total		76	40	52.6	402 ± 93.57	926 ± 639.88	1.20
Both	2	2	0	0.0	161 ± 21.21	70 ± 14.14	1.70
	4	1	0	0.0	284 ± -	240 ± -	1.05
	5	6	0	0.0	282 ± 18.13	247 ± 46.76	1.09
	6	43	9	20.9	313 ± 18.55	357 ± 59.22	1.16
	7	7	3	42.9	371 ± 21.53	603 ± 119.68	1.17
	8	11	7	63.6	359 ± 26.51	571 ± 125.02	1.21
	10	6	4	66.7	394 ± 42.81	757 ± 230.97	1.20
	12	7	7	100.0	419 ± 39.39	697 ± 246.69	1.20
	13	10	10	100.0	436 ± 34.94	1044 ± 289.80	1.23
	14	6	6	100.0	475 ± 70.73	1347 ± 611.18	1.18
	15	10	10	100.0	457 ± 52.42	1260 ± 443.62	1.27
	16	9	8	88.9	470 ± 50.31	1313 ± 487.24	1.22
	17	1	1	100.0	406 ± -	980 ± -	1.46
	18	3	3	100.0	497 ± 12.22	1487 ± 128.58	1.21
	19	4	4	100.0	548 ± 31.30	2140 ± 301.99	1.30
	20	1	1	100.0	530 ± -	1780 ± -	1.20
	26	1	1	100.0	560 ± -	2260 ± -	1.29
Total		128	74	57.8	381 ± 85.59	777 ± 552.36	1.20

± = standard deviation
Number of fish with unknown age that were excluded = 0
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 25. Age specific size and maturity conditions of sauger from Split Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
Males	1	1	0	0.0	170 ± -	54 ± -	1.10
	2	19	1	5.3	189 ± 13.10	67 ± 22.00	0.97
	3	3	1	33.3	240 ± 22.27	120 ± 20.00	0.87
	4	2	1	50.0	250 ± 8.49	160 ± 28.28	1.02
	5	13	9	69.2	262 ± 17.81	183 ± 26.89	1.02
	6	70	59	84.3	264 ± 15.46	188 ± 35.09	1.01
	7	10	8	80.0	265 ± 13.86	188 ± 47.33	0.99
	8	14	11	78.6	268 ± 14.18	194 ± 40.33	0.99
	9	6	5	83.3	287 ± 20.89	247 ± 57.50	1.02
	10	3	3	100.0	291 ± 8.08	267 ± 11.55	1.08
	12	1	1	100.0	326 ± -	380 ± -	1.10
	14	1	1	100.0	296 ±	240 ± -	0.93
	15	3	3	100.0	357 ± 14.19	540 ± 52.92	1.19
	18	1	1	100.0	388 ± -	440 ± -	0.75
Total		147	104	70.7	258 ± 36.67	184 ± 82.41	1.01
Females	1	1	0	0.0	190 ± -	62 ± -	0.90
	2	17	0	0.0	198 ± 20.19	76 ± 29.27	0.94
	3	3	0	0.0	222 ± 17.09	133 ± 75.72	1.15
	4	3	0	0.0	243 ± 12.06	160 ± 20.00	1.12
	5	18	8	44.4	263 ± 25.42	189 ± 57.89	1.01
	6	45	31	68.9	273 ± 20.17	213 ± 56.27	1.02
	7	13	12	92.3	280 ± 20.10	228 ± 59.18	1.02
	8	19	18	94.7	294 ± 26.06	271 ± 85.99	1.03
	9	13	13	100.0	298 ± 16.60	282 ± 53.20	1.05
	10	3	2	66.7	311 ± 41.00	340 ± 131.15	1.09
	11	4	4	100.0	322 ± 22.17	375 ± 55.08	1.13
	12	1	1	100.0	300 ± -	300 ± -	1.11
	13	4	4	100.0	331 ± 12.91	410 ± 52.92	1.13
	14	1	1	100.0	342 ± -	400 ± -	1.00
	15	3	3	100.0	334 ± 5.29	380 ± 34.64	1.02
	16	2	2	100.0	326 ± 5.66	380 ± 56.57	1.09
	18	1	1	100.0	320 ± -	360 ± -	1.10
	22	1	1	100.0	356 ± -	440 ± -	0.98
Total		152	101	66.4	274 ± 41.32	230 ± 104.06	1.03
Both	1	2	0	0.0	180 ± 14.14	58 ± 5.66	1.00
	2	36	1	2.8	193 ± 17.18	71 ± 25.71	0.96
	3	6	1	16.7	231 ± 20.31	127 ± 50.07	1.01
	4	5	1	20.0	246 ± 10.33	160 ± 20.00	1.08
	5	31	17	54.8	263 ± 22.21	186 ± 46.87	1.01
	6	115	90	78.3	268 ± 17.98	198 ± 46.02	1.02
	7	23	20	87.0	273 ± 18.76	210 ± 56.85	1.01
	8	33	29	87.9	283 ± 25.21	238 ± 79.27	1.01
	9	19	18	94.7	295 ± 18.30	271 ± 55.53	1.04
	10	6	5	83.3	301 ± 28.47	303 ± 92.45	1.09
	11	4	4	100.0	322 ± 22.17	375 ± 55.08	1.13
	12	2	2	100.0	313 ± 18.38	340 ± 56.57	1.10
	13	4	4	100.0	331 ± 12.91	410 ± 52.92	1.13
	14	2	2	100.0	319 ± 32.53	320 ± 113.14	0.96
	15	6	6	100.0	346 ± 15.97	460 ± 96.33	1.11
	16	2	2	100.0	326 ± 5.66	380 ± 56.57	1.09
	18	2	2	100.0	354 ± 48.08	400 ± 56.57	0.93
	22	1	1	100.0	356 ± -	440 ± -	0.98
Total		299	205	68.6	267 ± 39.90	208 ± 96.67	1.02

± = standard deviation
Number of fish with unknown age that were excluded = 32
Number of fish with unknown sex that were excluded = 29
Number of fish with unknown mat that were excluded = 29

Table 26. Age specific size and maturity conditions of sauger from Stephens Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
Males	3	1	1	100.0	250 ± -	180 ± -	1.15
	4	9	9	100.0	235 ± 11.49	120 ± 17.32	0.92
	5	56	51	91.1	244 ± 16.38	138 ± 37.10	0.94
	6	122	120	98.4	259 ± 14.47	165 ± 33.87	0.95
	7	12	12	100.0	274 ± 25.82	203 ± 60.80	0.96
	8	10	10	100.0	283 ± 21.32	234 ± 62.57	1.01
	9	4	4	100.0	300 ± 22.33	260 ± 78.32	0.94
	10	3	3	100.0	320 ± 12.49	333 ± 30.55	1.02
	11	4	4	100.0	335 ± 7.19	380 ± 43.20	1.01
	12	3	3	100.0	333 ± 20.53	373 ± 61.10	1.00
	13	1	1	100.0	328 ± -	400 ± -	1.13
	14	2	2	100.0	348 ± 25.46	400 ± 84.85	0.94
	15	3	3	100.0	341 ± 34.08	407 ± 127.02	0.99
	16	1	1	100.0	336 ± -	360 ± -	0.95
	19	1	1	100.0	360 ± -	500 ± -	1.07
Total		232	225	97.0	263 ± 29.17	181 ± 76.76	0.95
Females	5	6	1	16.7	237 ± 19.91	141 ± 40.53	1.04
	6	30	23	76.7	288 ± 26.56	251 ± 89.44	1.01
	7	14	13	92.9	303 ± 35.77	300 ± 116.62	1.02
	8	27	25	92.6	320 ± 17.65	370 ± 77.33	1.12
	9	5	5	100.0	325 ± 17.41	368 ± 74.30	1.06
	10	6	6	100.0	342 ± 17.41	440 ± 92.09	1.09
	11	3	3	100.0	347 ± 11.02	427 ± 23.09	1.02
	12	8	8	100.0	346 ± 20.64	448 ± 114.11	1.06
	13	2	2	100.0	378 ± 2.83	530 ± 42.43	0.98
	14	1	1	100.0	378 ± -	560 ± -	1.04
	15	2	2	100.0	380 ± 11.31	590 ± 14.14	1.08
	16	1	1	100.0	360 ± -	460 ± -	0.99
Total		105	90	85.7	311 ± 38.02	335 ± 127.46	1.05
Both	3	1	1	100.0	250 ± -	180 ± -	1.15
	4	9	9	100.0	235 ± 11.49	120 ± 17.32	0.92
	5	62	52	83.9	243 ± 17.13	138 ± 37.10	0.95
	6	152	143	94.1	265 ± 20.94	182 ± 60.14	0.96
	7	26	25	96.2	290 ± 34.39	255 ± 105.42	1.00
	8	37	35	94.6	310 ± 24.75	333 ± 95.01	1.09
	9	9	9	100.0	314 ± 22.57	320 ± 91.10	1.01
	10	9	9	100.0	334 ± 18.60	404 ± 91.53	1.07
	11	7	7	100.0	340 ± 10.42	400 ± 41.63	1.02
	12	11	11	100.0	342 ± 20.37	427 ± 105.18	1.05
	13	3	3	100.0	361 ± 28.94	487 ± 80.83	1.03
	14	3	3	100.0	358 ± 24.98	453 ± 110.15	0.97
	15	5	5	100.0	357 ± 32.58	480 ± 134.91	1.03
	16	2	2	100.0	348 ± 16.97	410 ± 70.71	0.97
	19	1	1	100.0	360 ± -	500 ± -	1.07
Total		337	315	93.5	278 ± 39.19	229 ± 119.12	0.98

± = standard deviation
Number of fish with unknown age that were excluded = 0
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 27. Age specific size and maturity conditions of northern pike from Split Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
Males	1	2	1	50.0	335 ± 91.92	280 ± 197.99	0.68
	2	5	5	100.0	393 ± 44.89	420 ± 151.66	0.67
	3	4	4	100.0	443 ± 94.21	650 ± 322.70	0.70
	4	3	3	100.0	553 ± 103.47	1300 ± 871.78	0.69
	5	1	1	100.0	442 ± -	660 ± -	0.76
	6	2	2	100.0	568 ± 53.74	1230 ± 494.97	0.65
	7	1	1	100.0	534 ± -	940 ± -	0.62
	8	1	1	100.0	662 ± -	2240 ± -	0.77
	9	2	2	100.0	663 ± 9.90	2220 ± 311.13	0.76
Total		21	20	95.2	484 ± 120.20	948 ± 723.39	0.69
Females	2	2	0	0.0	386 ± 56.57	420 ± 169.71	0.71
	3	7	5	71.4	498 ± 116.96	1089 ± 738.00	0.85
	4	2	2	100.0	498 ± 25.46	890 ± 240.42	0.71
	5	7	7	100.0	549 ± 51.96	1183 ± 457.88	0.69
	6	1	1	100.0	554 ± -	1080 ± -	0.64
	7	6	6	100.0	629 ± 55.65	1867 ± 633.55	0.72
Total		25	21	84.0	537 ± 97.74	1232 ± 669.98	0.74
Both	1	2	1	50.0	335 ± 91.92	280 ± 197.99	0.68
	2	7	5	71.4	391 ± 43.45	420 ± 141.89	0.68
	3	11	9	81.8	478 ± 107.96	929 ± 637.96	0.79
	4	5	5	100.0	531 ± 80.21	1136 ± 666.99	0.70
	5	8	8	100.0	535 ± 61.10	1118 ± 462.47	0.70
	6	3	3	100.0	563 ± 38.85	1180 ± 360.56	0.65
	7	7	7	100.0	616 ± 62.28	1734 ± 676.14	0.71
	8	1	1	100.0	662 ± -	2240 ± -	0.77
	9	2	2	100.0	663 ± 9.90	2220 ± 311.13	0.76
Total		46	41	89.1	513 ± 110.58	1102 ± 701.77	0.72

± = standard deviation
Number of fish with unknown age that were excluded = 0
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 28. Age specific size and maturity conditions of northern pike from Stephens Lake, 1989.

Sex	Age (Years)	Number	Maturity: Number Mature	Maturity: % Mature	Fl ± s.d. (mm)	Wt ± s.d. (g)	Mean Condition Factor
Males	3	2	2	100.0	382 ± 53.74	405 ± 190.92	0.70
	4	6	6	100.0	445 ± 50.64	660 ± 171.58	0.75
	5	10	10	100.0	468 ± 79.07	772 ± 556.27	0.68
	6	6	6	100.0	484 ± 43.73	803 ± 252.16	0.70
	7	1	1	100.0	550 ± -	1100 ± -	0.66
	8	2	2	100.0	645 ± 72.12	1990 ± 636.40	0.73
	9	1	1	100.0	730 ± -	2540 ± -	0.65
	10	2	2	100.0	847 ± 100.41	5320 ± 2149.60	0.85
Total		30	30	100.0	509 ± 130.00	1186 ± 1327.41	0.71
Females	4	11	1	9.1	425 ± 25.24	558 ± 92.72	0.73
	5	9	3	33.3	464 ± 41.31	687 ± 171.76	0.68
	6	5	3	60.0	526 ± 57.54	1044 ± 459.87	0.68
	7	3	1	33.3	577 ± 43.56	1413 ± 325.17	0.73
	8	5	5	100.0	727 ± 47.11	2468 ± 509.63	0.64
	9	5	4	80.0	701 ± 127.31	2780 ± 1642.25	0.73
	10	7	6	85.7	768 ± 81.86	3500 ± 1114.15	0.75
	11	3	3	100.0	826 ± 47.29	3573 ± 627.80	0.64
	12	3	3	100.0	745 ± 99.32	3053 ± 704.37	0.75
Total		51	29	56.9	595 ± 160.48	1797 ± 1373.72	0.70
Both	3	2	2	100.0	382 ± 53.74	405 ± 190.92	0.70
	4	17	7	41.2	432 ± 36.02	594 ± 130.72	0.73
	5	19	13	68.4	466 ± 62.37	732 ± 412.00	0.68
	6	11	9	81.8	503 ± 52.46	913 ± 363.57	0.69
	7	4	2	50.0	571 ± 38.10	1335 ± 308.27	0.71
	8	7	7	100.0	704 ± 62.89	2331 ± 543.18	0.66
	9	6	5	83.3	706 ± 114.49	2740 ± 1472.14	0.72
	10	9	8	88.9	785 ± 86.65	3904 ± 1467.20	0.77
	11	3	3	100.0	826 ± 47.29	3573 ± 627.80	0.64
	12	3	3	100.0	745 ± 99.32	3053 ± 704.37	0.75
Total		81	59	72.8	564 ± 154.98	1576 ± 1381.02	0.71

± = standard deviation
Number of fish with unknown age that were excluded = 2
Number of fish with unknown sex that were excluded = 0
Number of fish with unknown mat that were excluded = 0

Table 29. Length-weight curves for fish captured in Split and Stephens lakes, 1989.

Species	Lake	Log_e W = a+b * log_e L	r
Whitefish	Split	log_e Y = -12.198 + 3.189 log_e X	0.995
	Stephens	log_e Y = -12.254 + 3.202 log_e X	0.993
Walleye	Split	log_e Y = -12.473 + 3.189 log_e X	0.987
	Stephens	log_e Y = -11.481 + 3.025 log_e X	0.992
Sauger	Split	log_e Y = -12.169 + 3.119 log_e X	0.976
	Stephens	log_e Y = -13.564 + 3.361 log_e X	0.971
Northern pike	Split	log_e Y = -11.601 + 2.959 log_e X	0.978
	Stephens	log_e Y = -11.848 + 2.997 log_e X	0.989
Cisco	Split	log_e Y = -10.496 + 2.867 log_e X	0.973
	Stephens	log_e Y = -10.810 + 2.939 log_e X	0.954
White sucker	Split	log_e Y = -11.401 + 3.056 log_e X	0.994
	Stephens	log_e Y = -11.464 + 3.068 log_e X	0.981
Longnose sucker	Split	log_e Y = -10.856 + 2.935 log_e X	0.995
	Stephens	log_e Y = - 9.996 + 2.795 log_e X	0.971
Mooneye	Split	log_e Y = -12.083 + 3.152 log_e X	0.990
	Stephens	log_e Y = -13.109 + 3.347 log_e X	0.984

Table 30. Maturity rate equations for whitefish, walleye, sauger, northern pike and cisco (Stephens only) from Split and Stephens lakes, 1989.

Species	Lake	Sex	Regression *	r+	Age at 50% mature (yrs)
Whitefish	Split	males	Y =10.286 - 2.571 X	1.0	4.0
	Stephens		Y = 3.484 - 0.813 X	0.974	4.3
	Split	females	Y = 4.669 - 0.916 X	0.968+	5.1
	Stephens		Y = 1.290 - 0.298 X	0.654+	4.3
	Split	both	Y = 7.055 - 1.448 X	0.962	4.9
	Stephens		Y = 6.253 - 1.288 X	0.967	4.8
Walleye	Split	males	indeterminant data points		
	Stephens		indeterminant data points		
	Split	females	indeterminant data points		
	Stephens		Y = 5.962 - 0.649	0.973	9.2
	Split	both	Y = 6.103 - 1.040 X	0.945+	5.9
	Stephens		Y = 3.852 - 0.485 X	0.887+	7.9
Sauger	Split	males	Y = 4.470 - 1.063 X	0.969	4.2
	Stephens		indeterminant data points		
	Split	females	Y = 7.108 - 1.354 X	0.990	5.2
	Stephens		Y =11.817 - 2.089 X	0.981	5.6
	Split	both	Y = 4.626 - 0.879 X	0.974	5.2
	Stephens		Y = 2.191 - 0.790 X	0.972+	2.8

Table 30. Continued.

Species	Lake	Sex	Regression *	r+	Age at 50% mature (yrs)
Northern pike	Split	males	indeterminant data points		
	Stephens		indeterminant data points		
	Split	females	indeterminant data points		
	Stephens		Y = 7.630 - 1.353 X	0.994	5.6
	Split	both	Y = 0.697 - 0.751 X	0.992	0.9
	Stephens		Y = 4.01 - 0.929 X	0.992	4.3
Cisco	Stephens	males	Y = 4.140 - 1.102 X	0.917+	3.7
		females	Y = 1.233 - 0.448 X	0.991	2.7
		both	Y = 2.436 - 0.805 X	0.962+	3.0

* $Y = \log \frac{(100-Yi)}{Yi}$ where Yi = frequency of mature fish in age class i,

X = age (yrs)

+ = non-significant at $P \geq 0.05$

Table 31. Mortality rate equations for whitefish, walleye, sauger, northern pike and cisco (Stephens only) from Split and Stephens lakes, 1989.

Species	Lake	Instantaneous mortality (Z)	Annual mortality (A)	Annual survival (S)	r	Age classes
Whitefish	Split	0.269	0.236	0.764	0.861	11-13, 17, 20
	Stephens	0.439	0.356	0.644	0.977	12, 13-14, 15-16 combined
Walleye	Split	0.231	0.206	0.794	0.939	7-9 combined, 10, 12-14 combined, 15
	Stephens	1.139	0.679	0.320	0.886+	15-17
Sauger	Split	0.672	0.489	0.510	0.983	9-12
	Stephens	0.189	0.173	0.827	0.983	9-11, 12-14, 15-16-19 combined
Northern pike	Split	0.368	0.308	0.692	0.938+	4-5, 6-7, 8-9 combined
	Stephens	0.281	0.245	0.755	0.858+	6-7, 8-9 combined, 10, 11
Cisco	Stephens	0.535	0.414	0.585	0.999	7, 8, 10

+ = non significant at $P \geq 0.05$

Table 32. Walford curves for whitefish, walleye, sauger, northern pike and cisco (Stephens only) from Split and Stephens lakes, 1989.

Species	Lake	Walford curve	L_{∞} (mm)	Age classes used	r	Mean square error
Whitefish	Split	Y = 77.011 + 0.873 X	608	1-7	0.983	315.129
	Stephens	Y = 94.249 + 0.804 X	481	2-14	0.979	304.307
Walleye	Split	Y = 97.245 + 0.774 X	429	1-13	0.942	632.945
	Stephens	Y = 100.416 + 0.796 X	491	5-16	0.930	470.649
Sauger	Split	Y = 43.879 + 0.882 X	374	1-11	0.973	84.194
	Stephens	Y = 37.459 + 0.921 X	474	4-13	0.977	77.366
Northern pike	Split	Y = 111.435 + 0.869 X	848	1-7	0.968	589.674
	Stephens	Y = 91.364 + 0.932 X	1337	4-9	0.898	3203.642
Cisco	Stephens	Y = 46.357 + 0.879 X	382	3-11	0.819	505.968

Table 33. Relationship of Log_e ($L\infty - l_t$) and t (yrs) for whitefish, walleye, sauger, northern pike and cisco (Stephens only) from Split and Stephens lakes, 1989.

Species	Lake	Log_e ($L\infty - l_t$) = a-b*t	Age classes used	r	Mean square error
Whitefish	Split	$\log_e$ $(608 - l_t) = 6.340 - 0.144\ t$	1-7	0.992	0.002
	Stephens	$\log_e$ $(481 - l_t) = 6.178 - 0.215\ t$	2-13	0.984	0.021
Walleye	Split	$\log_e$ $(429 - l_t) = 5.888 - 0.243\ t$	1-13	0.996	0.007
	Stephens	$\log_e$ $(491 - l_t) = 6.434 - 0.206\ t$	5-15	0.915	0.128
Sauger	Split	$\log_e$ $(374 - l_t) = 5.369 - 0.116\ t$	1-11	0.982	0.006
	Stephens	$\log_e$ $(474 - l_t) = 5.812 - 0.082\ t$	4-12	0.986	0.002
Northern pike	Split	$\log_e$ $(848 - l_t) = 6.368 - 0.134\ t$	1-8	0.984	0.004
	Stephens	$\log_e$ $(1337 - l_t) = 7.185 - 0.084\ t$	4-8	0.939	0.003
Cisco	Stephens	$\log_e$ $(382 - l_t) = 5.492 - 0.084\ t$	3-10	0.915	0.009

Appendix 1

Two 24.5 cm stretched measure gill nets were set five times below Gull Rapids in an attempt to capture sturgeon. None were caught. The locations of the sets are shown in Figure 7 (S1-S5).

Appendix 2. List of Manitoba Department of Natural Resources Fisheries Branch reports written to date on data collected from the Churchill-Nelson River Diversion under the Northern Flood Agreement Claim numbers 12 and 18. Documents are listed in chronological order of publication.

Year	Title
1984	Patalas, J.W. 1984. Fish population data from Sipiwesk, Split and Stephens lakes, 1983. Man. Dept. Nat. Res. Fish. Br. MS Report No. 84-24, 66pp.
	_____1984. Fish population data from Notigi, Wapisu, Threepoint and Footprint lakes, 1983. Man. Dept. Nat. Res. Fish. Br. MS Report No. 84-25, 70pp.
1986	Derksen, A.J. 1986. Ecological Monitoring - Fisheries 1985 Progress Report. Man. Dept. Nat. Res. Fish. Br. April 9, 1986. 43.pp.
	Kirton, J.A.W. 1986. Fish population data from Rat, Karsakuwigamak, and West and Central Mynarski lakes, 1984. Man. Dept. Nat. Res. Fish. Br. MS Report No. 86-03, 48pp.
	_____1986. Fish population data from Split and Stephens lakes, 1984. Man. Dept. Nat. Res. Fish. Br. MS Report No. 86-04, 61pp.
	Green, D.J. 1986. Summary of Fish mercury data collected from lakes on the Rat-Burntwood and Nelson River systems, 1983-1985. Man. Dept. Nat. Res. MS Report No. 86-06, 359 pp.
	Mohr, L.C. and J.A.W. Kirton. 1986. Fish population data from Sipiwesk and Cross lakes, 1985. Man. Dept. Nat. Res. Fish. Br. MS Report No. 86-28, 83pp.
1987	Sopuck, R. D. 1987. A study of lake sturgeon (Acipenser fulvescens) in the Sipiwesk Lake area of the Nelson River, Manitoba, 1976-1978. Man. Dept. Nat. Res., Fish. Br. MS Report No. 87-2, 59pp.
	Hagenson, I. 1987. Fish population data from Rat and Split lakes, 1985. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-04, 59pp.
	Kirton, J.A.W. 1987. Fish population data from Macheewin, Osik, Footprint and Threepoint lakes, 1984. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-06, 78pp.

Appendix 2, continued.

Year	Title
1987	Green, D.J. 1987. Summary of fish population data from Rat and Threepoint lakes, 1986. Man. Dept. Nat. Res. Fish. Br. MS. Report No. 87-07, 47pp.
	Kirton, J.A.W. and L.C. Mohr. 1987. Fish population data from Wuskwatim and Apussigamasi lakes, 1984. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-08, 44pp.
	Sopuck, R.D. 1987. An analysis of changes in the Pipestone Lake fish community from 1980 to 1986. Man. Dept. Nat. Res., Fish. Br. MS Report No. 87-11, 59pp & Appendices.
	Livingston, L. 1987. A checklist of phytoplankton genera for Nelson River and Rat-Burntwood lakes, 1980, 1981 and 1986. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-14, 20pp.
	Hagenson, I. 1987. Fish population data from Split and Stephens lakes, 1986. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-26, 59pp.
	Green, D.J. 1987. Summary of fish population data collected from eight lakes on the Rat-Burntwood River System, 1985. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-27, 130pp.
	Mohr, L. 1987. Fish population data from Sipiwesk and Cross lakes, 1986. Man. Dept. Nat. Res. Fish. Br. MS Report No. 87-28, 87pp.
	Anonymous. 1987. A manual for ecological monitoring - data collection procedures. Man. Dept. Nat. Res. Fish. Br. June, 1987.
	Mohr, L. and Livingston, L. 1987. Ecological monitoring zooplankton analysis methodology for 1986/87. Man. Dept. Nat. Res. Fish. Br. June, 1987.
	Derksen, A.J. and D.J. Green. Total mercury concentrations in large fishes from lakes on the Churchill River Diversion and Nelson River. Canada-Manitoba Agreement on the Study and Monitoring of Mercury in Churchill River Diversion. Tech. Appendices to Summary Report Volume 4, paper no. 17.

Appendix 2, continued.

Year	Title
1988	Derksen, A.J. et.al. 1988. Ecological Monitoring - Fisheries 1986 Progress Report. Man. Dept. Nat. Res., Fish. Br. March, 1988.
	Livingston, L. 1988. Summary of phytoplankton data for the Nelson River and Rat-Burntwood lakes, 1987. Man. Dept. Nat. Res. Fish. Br. MS Report No. 88-04, 164pp.
	Green, D.J. 1988. Summary of fish population data from Rat and Threepoint lakes, 1987. Man. Dept. Nat. Res. Fish. Br. MS. Report No. 88-11, 55pp.
	_____. 1988. Summary of fish population data from Sipiwesk and Cross lakes, 1987. Man. Dept. Nat. Res. Fish. Br. MS Report No. 88-12, 90pp.
	Patalas, J.W. 1988. The effects of commercial fishing on lake sturgeon (Acipenser fulvescens) populations in the Sipiwesk Lake area of the Nelson River, Manitoba, 1987-1988. Man. Dept. Nat. Res. Fish. Br. MS Report No. 88-14, 38pp.
	Hagenson, I. 1988. Fish population data from Split and Stephens lakes, 1987. Man. Dept. Nat. Res. Fish. Br. MS Report No. 88-15, 66pp.
1989	Green, D.J. 1989. Summary of fish population data from Sipiwesk and Cross lakes, 1988. Man. Dept. Nat. Res. Fish. Br. MS. Report No. 89-11, 91pp.
	Livingston, L.R. 1989. Summary of phytoplankton data for the Nelson River and Rat-Burntwood lakes, 1988. Man. Dept. Nat. Res. Fish. Br. MS Report No. 89-07, 81pp.
	Green, D. J. 1989. Summary of fish population data from Sipiwesk and Cross lakes, 1988. Man. Dept. Nat. Res. Fish. Br. MS Report No. 89-11, 91pp.
	Green, D.J. 1989. Summary of fish population data from Rat and Threepoint lakes, 1988. Man. Dept. Nat. Res. Fish. Br. MS Report No. 89-13, 69pp.

Appendix 2, continued.

Year	Title
1989	Cherepak, B. C. 1989. The post-flood morphometry and bathymetry of Rat and Threepoint lakes, 1988. Man. Dept. Nat. Res. Fish. Br. MS Report No. 89-14.
	Ramsey, D. J. et al. 1989. Evolution of limnological conditions in lakes of the Nelson and Rat-Burntwood river systems after Churchill River diversion and Lake Winnipeg regulation: I. An Overview. Man. Dept. Nat. Res. Fish. Br. MS Report No. 89-15.
	Hagenson, I. 1989. Fish population data from Split and Stephens lakes, 1988. Man. Dept. Nat. Res. Fish. Br. MS Report No. 89-16.
1990	Green, D. J. 1990. Summary of fish population data from Rat and Threepoint lakes, 1989. Man. Dept. Nat. Res. Fish. Br. MS. Report No. 90-05.
	Green, D. J. 1990. Summary of fish population data from Sipiwesk and Cross lakes, 1989. Man. Dept. Nat. Res., Fish. Br. MS. Report No. 90-06.